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For the
British Orthopædic Association

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For the
American Orthopedic Association

Editorial Committee
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For the British Orthopaedic Association
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Vol. I, No. 5 MAY, 1919 Old Series: Vol. xvii, No. 5

The Journal *of* Orthopædic Surgery

SOME INTERESTING BACK CASES.

BY LORING T. SWAIM, M.D., BOSTON.

THE assertion that the sacro iliac joint can be subluxated or that it can be displaced and produce sciatica has provoked much discussion. In offering the histories of these cases I hope that some light may be shed upon this difficult problem.

The sacro iliac joints are admitted to be true movable joints with articular cartilage and capsule. They are held in place by excessively strong bands of heavy ligaments, reinforced by muscles. The sacrum, bearing the downward thrust of the body's weight upon the pelvis, is a rather weak articulation. Because of this downward pressure the inclination of the pelvis is of great importance in relation to strain of the sacro iliac joints, because if the pelvis is tilted forward the sacrum becomes more horizontal, and more weight falls on the ligaments; if the pelvis is upright most of the pressure is exerted upon the sacrum, wedging it into the grip of the ilia and exerting less pull on the ligaments.

Much misunderstanding exists as to the displacements of these joints. The displacements, when they do occur, seem to be mere rotations, a forward or backward rotation of one side of the sacrum on its iliac articulation. That these rotations are too slight to detect by x-ray is logical, because we have to rely on the stereoscopic vision to detect the minute variations.

Scientifically I feel that such a rotation cannot at present be definitely proved, but clinically it does take place in some few cases, we seem forced to believe.

The sciatica is due to pressure on the sciatic nerve, which crosses

directly over the middle of the sacro iliac joint, lying upon the ligaments as close to the joint as it can well rest. This pressure may be due to fluid in the joint, inflammation in the joint, swollen ligament, or inflammation in the region of the nerve from any abnormal condition of the joint.

In each case the manipulation was the same, consisting of raising the leg, with the knee straight, on the side where the rotation seemed to have occurred, to a perpendicular position or further, the opposite leg being held down by an assistant. The same procedure was followed with the other leg, and then the patient was turned on the face and the leg was hyperextended backward, pressure being brought to bear with the hand over the sacrum. The procedure was reversed in this position, raising the leg on the other side from the apparent rotation first, and after sufficient manipulation the back was strapped with adhesive and the patient was left lying on the back, with a small pillow filling in the hollow of the lumbar spine, a large pillow placed under the knees.

The following cases seem to suggest actual displacements:

Mr. M. was a farmer, 30 years old, weighing 250 pounds. He had always worked hard and was noted for his muscular strength. One day, while lifting a sugar barrel, he suddenly felt a sharp pain in his low back, which "doubled him up." After a week's rest he was practically well except for a feeling of weakness in his leg and sacral region. Three months later, while splitting wood, the acute pain returned, localized in the left sacro iliac joint and extending down the left leg along the sciatic nerve to the foot. He was in bed this time for three months, during which time he could not straighten his left leg or rest on his back. When first seen, three months after this second mishap, he was suffering such pain that he was short of breath. All motion produced pain, which was referred definitely to the left sacro iliac joint. This joint was very tender to touch, and leg raising was impossible because of pain. X-rays showed no definite evidence of displacement. The left hip was normal. The only evidence of rotary displacement was the increased prominence of the left posterior superior spine of the ilium, as compared to the right, with a deeper sulcus between it and the sacrum. There was no demonstrable evidence of infection anywhere, and no tumors to be felt by rectum. Manipulation was advised. Since the patient was in such pain, he was given a large dose of asperin and morphia for the night and placed on his back with a pillow under the small of the back and two more under the knees. He slept heavily. In the morning, when preparation was made for manipulation, it was observed that all the pain had ceased. Leg raising was possible with limitations. The posterior iliac spines seemed equally prominent and the legs were equal in length. Manipulation

was given up. A double plaster spica, extending from the armpits to the knees was applied at once, and left on for three weeks. After this a light brace was fitted, and from that night to the patient's discharge, in four weeks, there was no recurrence of pain. A year later, while lifting the back of a carriage the pain returned, this time there being no outward change in the sacro iliac joints. Renewed support, after rest, gave entire relief.

In this case it seems probable that the sacrum had rotated forward from the ilium on the left, bringing pressure on the nerve. Complete relaxation caused the slight readjustment to take place with almost immediate cessation of all symptoms.

Mr. H., a coal dealer, forty years old, a moderately heavy man of powerful build, who "strained" his back shovelling coal. He had several manipulations. After the last one he was unable to stand for three days because of the pain in the right low back and down the sciatic nerve on the right. The physical examination was negative for infection or organic disease. The x-ray showed large transverse processes on the fifth lumbar vertebra and the pelvis inclined downward so as to make a true articulation between the fifth transverse process and the wings of the ilia. There was no evidence of disease or displacement of the sacro iliac joint seen in the plates. Locally there was tenderness over the posterior superior spine of the ilium on the right, which seemed more prominent than the left. Leg raising on the right was 40°, as compared with 90° on the left. The sciatic nerve was not tender. The right leg was shorter than the left. A support was tried for several weeks without relief. Then, under anesthetic, he was manipulated without definite sense of slipping of any displacement. He was better at once. The pain decreased, his legs were equal in length, and only after standing for some time did the sciatic pain recur. Everything went well until he had acute tonsillitis, after which the back again became tender and he had more pain in his right leg. This gradually diminished and he has steadily improved. Five years have gone by with no recurrence of symptoms, even with hard physical work.

I believe this was a strained joint, rotated slightly by manipulation, and replaced later. Some infection settled in the injured, inflamed joint, which subsequently cleared up.

Mrs. H. was a woman of 43, much under weight and lacking in muscular strength. The chief complaint was left sciatic pain from hip to toes and pain in the left sacro iliac joint. The history showed overwork for a winter, with much loss of strength, footache for a month, and finally backache for one day. The next morning, as she tried to close a window, there was a sudden severe pain running from the left hip along the sciatic nerve to the left toe. She collapsed and was unable to get out of bed for ten days. The pain required morphia. When seen, she lay with the left hip flexed, and any movement caused pain. The examination revealed some bad teeth with pyorrhea, no tumors, and the pelvic region was negative except for pain over the

sacro iliac joint on the left. Locally, there was a spot inside the left superior posterior spine of the ilium which was tender on deep pressure. There was a half-inch atrophy of the left leg muscles, and the buttock also was flaccid. Leg raising on the left was limited to 20°, and produced much pain in the back. The x-ray showed a blurring of the left sacro iliac joint, although no definite evidence of displacement. The back was manipulated. There was a sharp click on lifting the left leg with the knee stiff. This could be felt and heard. The back was strapped, and after the anesthetic wore away there was no pain except at the knee and a little in the back. Better tone of the left leg muscles was noted in nine days, and in a month the leg was strong enough to use, and she was able to be about, with a support. The atrophy had practically gone. In three months the legs were alike, and she had gained 20 pounds. A year later, after overdoing hanging curtains, etc., pain returned in the sacro iliac joint. Examination again showed tenderness over the right joint, with slight limitation of leg raising which caused pain in the back. Heat and rest with support gave relief, and for six years she has stayed well, except when tired or unsupported. The rapidity of the relief in this case was astonishing.

Judge C., a man of 64, while on a vacation had a fall, landing on the right ischium, which caused him such acute pain that he felt "stunned." Ten days later the pain had gone. Three weeks later, while rowing a low-seated boat, he had "a feeling as if something cracked," with a sharp pain in his lower back. He could hardly move He had manipulative treatment for a while, which relieved him somewhat, but the pain recurred intermittently and he became stiff. After six months of this, he found one day that it was impossible to get about. When seen, seven months after the onset, he was normal physically; locally, he had a flat back, with slight tenderness over the sacral region. There was a marked hamstring spasm of the left leg, and all motions were limited. During the examination there was a slight click heard while lifting the left leg, with pain following. The back was strapped, and, much to Judge C.'s joy and my surprise, the next day he had no pain. Soreness in the calf of the leg and a dull ache in the right sacro iliac region disappeared in about a month. The x-ray showed only an increased density between the fourth and fifth lumbar vertebrae, with what appeared to be a chip off the lower portion of the body at the fourth vertebra on the right side. The sacro iliac joints were apparently normal. This was taken after the lucky accident. What happened, I do not know, but something that had been abnormal became suddenly normal and relieved irritation of the sciatic nerve.

Mr. B. was a strong, healthy man of 43 (seen in consultation after a week's rest in bed). The history is that in December, 1913, he fell, causing unpleasant sensations in the region of the right iliac fossa. He had some pain down the back of both legs. He became very nervous and depressed. Examination showed him to be quite tender over both sacro iliac joints. Leg raising was limited on both sides. He

admitted having an ache in the small of his back, and quick motion caused pain. His legs were equal in length. He spoke of a "lumbago" two years before. X-rays showed a lumbo sacral articulation of the fifth transverse process, and the left ilium was somewhat higher than the right in relation to the sacrum. A week's rest in bed caused entire cessation of pain in the back. There was no manipulation, although this was advised at the consultation. The subsequent history is that some weeks after leaving the hospital, while climbing a fence, he felt a distinct click in his back, localized at the left sacro iliac region, which immediately relieved him of all pain. This was over a year ago and he has had no recurrence of the trouble.

Dr. V., 54, was seen in consultation for sciatica of six weeks' duration. For a year he had been troubled with a mild aching in the lumbar region after standing. Usually this was relieved by extending the right leg behind him. Six months later he had an acute attack of "lumbago," and went to bed for a week, during which time his back began to get stiff. He tried to work for a month, then went for a trip to rest. The back and leg, however, continued to ache. This soon became pain, with numbness in the right leg, and he was lame. Osteopathy was tried without relief. The pain became so bad he had to come home, with a constant agonizing sciatica, requiring morphia. The only relief he had was by hyperextending the right leg backward, resting the hands on the floor. When seen six weeks later, he was listed to the side when standing and could not lie on his back because of the pain in his back and right leg. Tenderness over the right sacro iliac joint was marked. The posterior superior spine of the right ilium was tender and prominent. Leg raising was 30° on the left and none on the right. The length of the legs was equal. The right sciatic nerve was tender in its whole course, the right buttock was flabby and all the muscles of the leg were atrophied and flaccid. X-rays failed to show any lateral displacement of either articulation and appeared normal. There was a slight lumbar lateral curve to the left. Manipulation was done under ether, and a distinct slip was not only felt but heard while hyperextending the right leg backward, and the prominent posterior spine of the ilium on the right was more like the left than before manipulation. The back was strapped with adhesive. The next day there was no pain at all, only lameness. In a week he was up, with a support, and no return of pain in the leg or back, and the tone of the right leg muscles had increased noticeably. Five days more and he walked without pain. There was occasional pain at night when in bed. This was relieved by adhesive strapping. During the next month he had a little pain in the leg, at times up at 4 a.m. The lateral list and the tenderness of the back disappeared. The examination showed no difference in the two sides of the sacro iliac joint. The atrophy of the muscles continued, but the tone was good. The nerve tenderness had gone. The support was continued. Six months later the pain was all gone; he was working and the atrophy had almost disappeared. In a year all signs and symptoms had disappeared and he walked and acted perfectly normal. Exercises were given to strengthen the whole

muscular system and the support was to be gradually discarded. From 1914 to the present day he has had no recurrence.

It is hard to explain, with our limited powers of touch and the apparent inability to get definite enough evidence from plates of this region, just what took place in these cases. That some very small misplacement was present seems probable. I am forced, by the results and from the consideration of the referred nerve pain, to think it true that it was close to the sciatic nerve, and in one or two cases the trouble was severe enough to cause atrophy of the muscles supplied. The extraordinary rapidity of the relief and the apparent slip to be felt in most cases is significant that something went into place to cause relief.

Nerve stretching of the sciatic nerve will not relieve backache in my experience.

I admit I do not know what happened to most of the cases, but the last case was so pronounced, the change in the relation of the iliac spines in a thin man was so noticeable after the slip, and the relief was so complete, that I feel sure this, at least, was a sacro iliac rotation on the right joint.

The members of the American Orthopedic Association will be grieved to learn of the sudden death of Dr. H. Augustus Wilson of Philadelphia, on April 16, 1919. A further notice of Dr. Wilson's life will appear in a later number of this JOURNAL.

Correspondence

Washington, March 20, 1919.

To the Editor:—

As stated in the circular memoranda for editors of medical publications issued by the Surgeon-General's Office, on March 27 and May 22, 1918, it is required by paragraph 423, Manual of the Medical Department, that all medical manuscripts by medical officers, U. S. Army, intended for publication, shall be first submitted to the Surgeon-General's Office, Washington, D. C., for approval. This regulation, which has been very courteously complied with to date, is still in force so far as medical officers on active duty are concerned. In the case of medical officers recently retired from active duty, it is requested, as a courtesy to the Surgeon-General and in aid of assembling material for the medical history of the war, that all medical manuscripts based upon military or official records or upon military experience during the war, be submitted, as heretofore, to the Secretary, Board of Publications, Surgeon-General's Office, Washington, D. C., for record and approval, and that such MSS. be accompanied by a carbon copy. Upon approval, the original copy will be forwarded to the journal designated, for publication, and the carbon will be filed in the records of the Medical History of the War.

For the Surgeon-General:
(Signed) C. R. DARNALL, *Colonel, Medical Corps, U. S. A.*,
Executive Officer.

RECONSTRUCTION HOSPITAL ON PARKER HILL.

BY MAJOR FREDERIC J. COTTON, M.C., U.S.A., BOSTON, MASS.

On receipt of the editor's suggestion that something might be written about the opening up of the U. S. A. General Hospital No. 10, Parker Hill, Boston, the first thought was to reply that there was nothing to write, as we have not yet accomplished anything. And that of course is true, for our patients are few and recent, and end-results—the only important item—are not yet at hand.

Yet the preparation is in a way an accomplishment, and at least the opening has been so auspicious, the hospital plant so well conceived and wrought, so well equipped as to deserve brief notice, and the plans for coördinated work seem, perhaps, more than usually comprehensive, perhaps because they have been so long in maturing.

For there is a bit of story connected with this particular institution, worth telling because it is wrapped up with the development of the reconstruction idea which has come to be so characteristic of our whole conception of military medical service in this war,—peculiarly worth telling in this JOURNAL because the reconstruction idea, now general, was, in its infancy, an orthopædic conception.

It was in a preparedness committee of the American Orthopedic Association that the reconstruction idea had its birth, so far as this country is concerned, and there is nothing here or planned for the work of this hospital that was not included in the scheme laid down by Colonel Goldthwait, Colonel Brackett, and the writer, a year and a half ago.

The hospital was planned partly to be a concrete expression of the reconstruction plan. This plan,—a scheme for really coördinated care of returning wounded, running from surgery through physiotherapy, bedside occupation, and shopwork to real vocational work,—was promptly adopted by the Surgeon-General, but at the time no Government funds were available for construction of such hospitals.

Then it was suggested to the great Benevolent Order of Elks that such construction might well be a part use of their war fund.

Their war commission, patriotic and far seeing, looked into the matter,—thought well of it.

So, a year ago, the commission went to Washington and, through their spokesman, ex-Governor John K. Tener, offered such a hospital to Surgeon-General Gorgas, who accepted for the Government.

The Elks' Reconstruction Hospital has been built and is the central

and important member of No. 10. Built on the top of Parker Hill, on the site of the old Reservoir, filled in the summer of 1917 by Mayor Curley to provide a site. This hospital represents an expenditure by the Order of about $300,000.

The plans, partly drawn in the Surgeon-General's office, partly by Lewis F. Day, and by Desmond and Lord for the Elks, were carefully studied and seem to have been wisely ordered. The Elks' Hospital is purely a treatment hospital building, furnished with heat and light and operating facilities by the adjoining Robert B. Brigham Hospital, through tunnel connections.

The Elks' Hospital has, therefore, in relatively small space, accommodation for over three hundred patients, a fully equipped building for electrotherapy, hydrotherapy, and mechano-therapeutic work, a shop building 150 feet by 22 for curative work and for the surgical appliance shop, and a barracks building. The whole block of building is 300 by 150 feet, with 45,000 feet of floor space.

The equipment, of course, is army equipment, save for the excellent outfitting of the shops, which the Red Cross did, and for the furnishing of a ward by the people of the town of Belmont.

After the erection of the Elks' Hospital it became evident that the need was greater than had been foreseen. It was too small.

Then the trustees of the Robert B. Brigham Hospital, with the finest spirit of service, entered into an agreement with the Government by which they turned over their hospital for war use, taking care of the patients of their charity elsewhere.

At the same time Mayor Peters, for the City of Boston, offered the West Department of the City Hospital in West Roxbury, for the use of the Government during the war period.

This is an elaborately modernized hospital plant of two hundred and fifty beds, fully equipped, prepared by the City for a contagious hospital, but not yet used. It is six miles away from Parker Hill, but so well equipped as to be suitable for a half independent unit. It was accepted and is in use.

Beside all this, the Massachusetts Women's Hospital (the old Charity Club) was offered and was leased for nurses' quarters.

U. S. A. General Hospital No. 10 consists, then, of four hospitals,—the Elks', built for the Government and turned over; the Brigham, leased; the West Roxbury plant at a dollar a year; the Massachusetts Women's, leased.

This, when you come to think of it, is not a bad community showing,

more particularly if one considers the very wonderful spirit of service in which the representatives of these institutions coöperated with us in every way.

Colonel Joseph Taylor Clarke was assigned to the command and has under him these four properties, now in commission and actual use.

It is too soon to say much as to the work. One may say, however that the personnel is on hand, large, and very competently trained for all branches.

It looks as if the work were to be predominantly orthopædic in the larger military sense, and preparation has been made for such surgery as this calls for, not always showy, but calling for high grade work of specially trained men and for the very best operating conditions.

Provision is at hand for the carrying out of first rate shop work, including the making and fitting of artificial limbs.

The physiotherapy department is the part of this hospital that should be strongest. It looks strong and the plans are laid for a great deal of work by the doctors and the excellent staff of trained women aides.

Rather unusually extensive use of electrical treatment is contemplated, and of hydrotherapy.

The educational department amply staffed from Washington, bids fair to be very busy,—is already busy.

The plan of work is in no large essential different from what is projected elsewhere,—what has been done to some extent at the Walter Reed Hospital in Washington and three or four other places.

This is just a story of the origin and completion of a special hospital which we hope may prove of special value for the returning men for whom the best we can do is none too good.

Beyond this, we have high hopes of being able to help in standardizing methods to aid in the cure of military orthopædic cases in a way that may help solve the like problem in peace.

In the past, our civil work of this sort has been poor, not so much because we did not know as because we were not in shape to coördinate our special workers and special means of cure.

Here, today, we have an institution, particularly favoring the working out of such coördination.

With hard work and the mutual coöperation we hope for and expect, something should be accomplished to give us a broader grasp of the general problem of reconstruction, civil as well as military, and show us the lines of organization and coöperation along which we must move to achieve results in this line of scientific (and economic) endeavor.

DIAGNOSIS OF SYPHILIS OF BONES AND JOINTS.

BY JAMES O. WALLACE, M.D., PITTSBURGH, PA.

In observing cases of bone and joint syphilis for the last five or six years, I have been impressed by the number of mistakes made in the diagnosis of these conditions. Time and time again cases have presented themselves in which operations for osteomyelitis have been done. Joints have been opened and the cases have not done well.

The interpretation of roentgenograms has been a very difficult subject to many men.

In reading textbooks on syphilis of bones and joints one finds the subject almost passed over, or at most, little information is given. In view of this fact, students have little access to printed material which will give them any adequate idea for their instruction. There have been numerous articles in the literature treating upon the subject, but in the main these are only reports of cases. No article that I have found has been presented giving the differential diagnosis from the x-ray and laboratory findings as well as the clinical, physical and history findings, hence, it is my purpose in this paper to present the differential points in the diagnosis of syphilis of bone and joint conditions, setting forth in as clear and simple a manner as possible, the findings that are known up to the present time.

It is not within the scope of this paper to discuss the various classifications of bone and joint syphilis.

Bone and joint syphilis has been divided into two general heads—congenital and acquired.

Parrott gives the following classification in congenital bone syphilis:

1. Atrophic (osteochondritis).
2. Osteophitic.
   a. Osteoid (all ages) resembles secondary lesions in adults.
   b. Rachitic (only after 5 or 6 months) is a localized or gummatous formation resembling the tertiary found in adults.

Bingold gives the following classification in acquired syphilis:

1. Osteoperiostitis.
   a. Diffuse or neoplastic.
   b. Circumscribed or hypertrophic.

In the classifications of joint syphilis De Fontaine presents the following:

1. Arthralgia.
2. Subacute arthritis.

3. Hydrarthrosis.
4. Perisynovial gummatous conditions.
5. Association joints with bony syphilis.

O'Reilly also gives a classification in acquired and congenital joint syphilis:

1 Acquired.
   a. Early secondary (arthralgia-multiple).
   b. Secondary (synovitis with hydrops).
   c. Tertiary (gummatous osteitis).
2. Congenital.

Same types as acquired but one form seems to merge into others. This agrees with findings of Parrott, Hutchin, Morgan and Eve.

Wysochi says no definite classification of joint syphilis is possible

In our cases we have been unable to make any definite classification. Every case of joint involvement has been secondary to an osseous lesion.

In all suspected cases of syphilis of bones and joint diseases it is essential that we go into the family and personal history of the patient in minute detail, bringing out a complete history of the parents as chronic rheumatism, various eye troubles, chronic bone suppurations, miscarriages, sterility, etc., as well as definite history of the primary infection in either parent. In the personal history of the patient in congenital syphilis, one should look for such symptoms as rhinitis, lesions of the skin and mucous membranes, iritis, suppurating lesions of hands or feet and malnutrition.

In acquired syphilis it is not always possible to obtain a definite history, although in negative cases one should not be misled, for upon further questioning the patient in regard to the characteristic initial lesion or secondary manifestation, a history of syphilis may be obtained. There are cases, however, in which it is impossible to obtain a positive history, yet, upon inquiry, the patient may state that she has had chronic rheumatism or miscarriages or history of sterility which would excite suspicion. In a negative history one must not overlook the fact that in any suspected case a Wassermann should be made.

Symptoms. Onset is generally insidious with frequent relapses. Occasionally it begins immediately after weaning. In about 15% of our cases it followed a definite history of trauma and the fact that cases generally occur in bones or joints most exposed to trauma, would lead one to assume that trauma was an important factor. The absence of definite history of trauma is probably due to the fact that it is overlooked by the patient.

Pain. Pain was the general symptom in our series of cases. In 56% of the cases of acquired syphilis osteocopic pain was present in a very severe form; in 19% of the congenital cases it was present, but not very severe, and in our remaining congenital cases there was no osteocopic pain present, although there was extensive involvement of the bone. Pain was present in every case except one, but it was insignificant in proportion to the pathology present. This agrees with the findings of most authors. We found that movements of the involved joints increased the pain, except in one instance. This is not in accord with findings of many writers.

Swelling. Swelling was present in 50% of our cases.

Physical examination. In 70% of our cases tenderness was elicited, and of the 10 cases not showing tenderness, five were cases of spinal syphilis or Charcot spine. Redness and local increase of temperature were present in but ten of our cases. Swelling was present in 55% of our cases, excluding the cases of spondylitis. In taking into consideration the actual swelling of the joints, all the cases show that bony parts also were swollen. This is in accordance with the observation made by other authors, and we consider it a diagnostic sign. Fluctuation was comparatively a rare sign, we finding it present in only 9% of our cases. In 27 cases in which there were joint symptoms, 50% had limitation of motion. This is not in accordance with the reports given by the majority of authors. In our cases of spondylitis four were tubercular, complicated with syphilis, or purely syphilitic.

One case showed a characteristic kyphosis with no other local physical signs, although the roentgenogram showed destruction of two dorsal vertebrae. In another case with no deformity, showing no local physical signs, evidence of bone destruction with new deposits of bone was seen in the roentgenogram. (See case No. XIII.)

Sloan says syphilis of the spine may occur at any age from infancy to late life but that it is most prevalent about the fourth decade. In differentiating it from tuberculosis one must be guided by history, laboratory findings and other syphilitic markings noted in the physical examination.

Whitney and Baldwin bring out a new sign in the diagnosis of syphilis of the spine. In examining the spines of 100 known syphilitics they found a localized area of limitation of motion with a hypotonia of the remaining portion of the spine in about 68 cases. They considered this limitation of motion was due to the perisynovitis of the limited portion of the spine with adhesions. If the process involved intervertebral joints the patient had a resultant flexion of the spine, and resultant

extension of the spine if the laminae were involved. This sign was always developed in old patients, where every other evidence of the disease may be lacking.

Laboratory Findings. In our series of 38 cases we have 24 cases with a positive Wassermann test; 2 doubtful, 8 negative, 1 negative, giving a positive luetin test, and in 4 of our cases no Wassermann test was made, these patients giving a positive history of syphilis. Out of 38 cases, 35 were treated, the treatment consisting either of administration of salvarsan or inunction of mercury and protoiodide by mouth or mercury salicylate hypodermatically. The results of our cases showed marked improvement in 24 cases, 5 of this number having given a negative Wassermann; slight improvement was present in 6 cases, 1 of which gave a negative Wassermann and 5 a positive Wassermann. Perhaps the reason for so large a number of cases not improving markedly, is due to the fact that they were treated in the dispensary and it was difficult to carry out treatment as prescribed. Three of the patients upon whom a Wassermann test was not made were not treated. One of our patients died following the administration of salvarsan. Two patients died before there was any evidence of improvement, following administration of antiluetic treatment, 1 of meningitis, and the other from amyloid degeneration of the liver. One of our cases gave a negative Wassermann, but a positive luetin test, and improved under syphilitic treatment. In our cases that gave a negative Wassermann we put them on mercurial inunctions for one or two weeks, then stop treatment for two weeks and take another Wassermann test. We have secured positive Wassermann tests upon several such cases and at present this is a routine measure in our hospital. We have found in our experience that the results of Wassermanns done by the old method have been more in accordance with clinical and roentgenographic findings than the Wassermann done after the method of Noguchi.

Dr. Haythorn, director of the Singer Laboratory of the Allegheny General Hospital, has given us the following data on the value of the old Wassermann and Noguchi's modification of it.

"The objections which we have found in our laboratory to the use of the Noguchi system and its modifications for doing the Wassermann reaction may be summarized as follows:

1. The quantities used are very small and are measured by the number of drops from capillary pipettes which are not accurately standardized. Thus the quantities used vary slightly for each test. Because of the very small amounts used the factor of error is great.

2. Of the three reagents which were formerly used to impregnate

paper, amboceptor is the only one which has stood the test of general usage. It has been our experience that if a piece of paper of a certain size, presumably containing a certain amount of amboceptor, was found to hemolize the blood of one person in the presence of a small amount of complement, it often required a piece of the same paper of larger size and a much greater amount of the same complement to hemolize the same amount of blood from another individual, showing a great individual variation in susceptibility to hemolization in human bloods.

3. Quantitative Wassermanns on a comparative basis are impossible with this system.

We have, in favor of the original Wassermann and its modifications where the sheep system is used and controlled in every instance by absorbing out and testing for natural anti-sheep amboceptor in the human sera to be tested:

1. The use of accurately titrated quantitive amounts of each of the reagents, against constant amounts of serum.

2. The opportunity of using accurately titrated and measured amounts of several antigens which are thus placed on a quantitive basis.

3. A surer means of controlling all of the factors in the test by daily titrations of measured amounts of amboceptor and complement as well as frequent quantitive titrations of the antigens.

4. The results of six months' parallel tests on the same sera with both systems, which showed several tests to be positive with the Wassermann modifications which were negative with the Noguchi, and in which all of the cases were clinically syphilis and responded more or less to anti-syphilitic treatment.

We have, therefore, adopted the controlled sheep system and are using both cholesterin reinforced and acetone unsoluble antigens."

Observers claim a relatively high percentage of negative Wassermanns in bone syphilis. (Fisher 10%.)

When a Wassermann is negative in a child with bone syphilis one or both parents should be tested.

Keyes found patients with late tubercular condition giving Wassermann, reactions, with a higher percentage of positives with cholesterinized antigen than lipoidal antigen.

Snow and Cooper:

1. "The percentage of non-syphilitic, tuberculous patients whose blood may bind complement with non-cholesterinized antigens is so small as to be practically negligible. Complete complement-fixation, *i.e.*, a strong Wassermann reaction with non- cholesterinized antigen, in a

tuberculous patient, is as adequate presumptive evidence of syphilis as it is in a non-tuberculous.

2. That the sera of non-syphilitic tuberculous patients may give partial—to complete—complement-fixation with cholesterinized antigen in about 31% of cases."

Roentgenograms. 1. Periostitis, either diffuse or local, is accompanied by the formation of an osteoid material which shades off in appearance from a gelatinous-like substance in late deposits to a heavier or calcareous appearance in older deposits. We believe that this deposit in layers is due to successive attacks of periostitis, as in our cases No. XV, in which he had two attacks of periostitis and in which the x-ray showed the different layers; and No. XVII, in which he had successive attacks of periostitis and in which the x-ray shows the different layers. A new layer is laid down in each succeeding attack. With a high-power hand glass the appearance of the topmost layer is that of a feather edge. Here and there over different parts of a bone you may find isolated patches beneath the periosteum raising it from the bone cortex. A marked circumferential thickening of the periosteum is a typical finding in bone syphilis. Ware states that this predominance of periosteal thickening, aside from other bone changes, stands out conspicuously in favor of syphilis.

2. Osteitis may be either diffuse or local; in very early cases there may be no involvement of the cortex shown. A characteristic osteitis is present in the majority of cases at a later date. This is marked by a thickening of the substancia corticalis or of both the substancia corticalis and the spongioid bone. The process is a building around of one layer upon another. In osteitis the distinctions in the shadows perceptible in normal bone become denser (sclerosed); this growth of cortical bone may be either external, producing so-called bowing of the shaft described by Fournier, or internal, encroaching upon or obliterating the medullary cavity. As the process goes on the bone and periosteum may become fused into one mass. Gumma formation generally accompanies osteitis when the process is severe. They are usually single but may be multiple. They may be very small or involve enough of bone thickness to cause a pathological fracture. As the osteitis goes on, areas of necrosis may occur surrounded by areas of greater bone activity. These appear on the roentgenogram as areas of translucency surrounded by areas of osteosclerosis. Typical acute gummata are easily recognized. They have generally a translucent center with destruction of bone; immediately surrounding this central mass there is a dense sclerosed wall and over this, generally, an area of periostitis.

In chronic gummata there is marked sclerosis with localized swelling, destruction of bone usually being present.

3. Osteochondritis.—In congenital cases we have an osteochondritis in which the process begins in the diaphysoepiphyseal junction. The roentgenogram shows a thickening of the bone itself with deformity due to separation of the shaft and epiphyses caused by the disease.

DIFFERENTIAL DIAGNOSIS.

1. From Tuberculosis.

In syphilis the process begins in the epiphyseal end of the diaphysis or in the shaft, while in tuberculosis it begins in the epiphyses.

There is marked periosteal thickening in syphilis, while there is little or none in tuberculosis.

In syphilis there is bone proliferation, in tuberculosis bone destruction.

In syphilis there is hypertrophy; in tuberculosis. atrophy.

In syphilis the swelling is due to thickening of bone, while in tuberculosis the swelling is due to thickening of the soft parts.

In syphilis suppurating sinuses are rare while in tuberculosis they are not uncommon.

In syphilis multiple lesions are common, while in tuberculosis they are rare.

2. From Chronic Pyogenic Osteomyelitis. (Plate No. XXIII).

In syphilis, periostitis is marked, while in chronic pyogenic osteomyelitis it is not so marked and may be slight or absent.

Osteosclerosis and osteoporosis are more uniform in syphilis than in chronic pyogenic osteomyelitis.

An involucrum is present in chronic pyogenic osteomyelitis but not in syphilis.

New bone formed is thinner and more porous and the borders are thinner and more irregular in chronic pyogenic osteomyelitis than in syphilis.

In chronic pyogenic osteomyelitis there is extensive destruction or absence of bone cortex and a sequestrum large or small, while this is absent in syphilis.

Some cases are hard to differentiate.

3. From Sarcoma. (Plate No. XXIV.)

Sarcoma affects the ends of the diaphysis by preference.

There is some disturbance in the minute structure of the bony tissue.

It consists of absorption of lime salts. May find associated increased density in certain areas. This disturbance is comparatively localized and spreads peripherally, the greatest destruction being at the point of origin. Associated is a swelling and new growth. If central sarcoma, the walls of the bone seem to be bursting apart, as it were. In peripheral sarcoma the surface of the bone is found to be rough and uneven and the density shades gradually into the soft tissues. In this peripheral variety the periosteum is often found lifted up highest over the greatest diameter of the tumor and then sloping gradually downward until it becomes a part of the bone again.

4. From Carcinoma. (Plate No. XXV).

In carcinoma there is never any tendency to bone hypertrophy, as one would expect from the pathology. It evolves not only the bone substance but the stroma as well, hence we would see an almost complete destruction of the bone substance. The bone substance remaining in the tumor is spongy, porous and eroded.

5. From Rachitis (Lovett).

In rachitis the epiphyses may be absent or cloudy in roentgenograms, while in syphilis they are clear and not seriously disturbed.

The changes at the epiphyseal end of the diaphysis appear in syphilis in the fetus or in the new-born, while in rachitis they occur in the first dentition.

Cortical thickening in rachitis is endosteal and is always on the concave side of the curve, while in syphilis it is periosteal and is uniformly on the convex side of the curve.

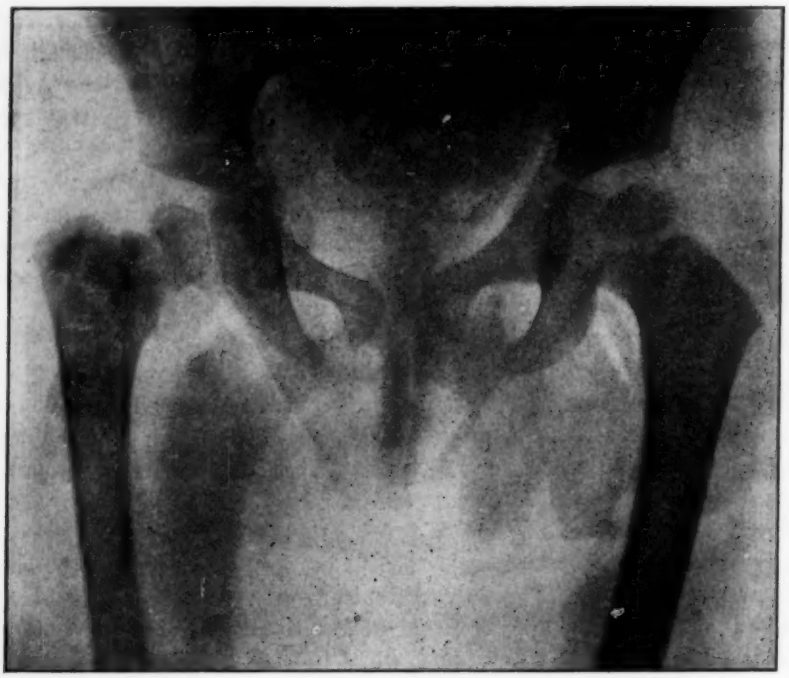
Exception (See Plate No. XXVI).

The two conditions are very often associated, making the differential diagnosis very difficult.

CASES.

CASE No. 1. A. N., age, 1½ years, white, female, American. Family history: Father had chancre; mother, causeless miscarriage. Began right after weaning, when child refused to walk. When seen child walked with limp, apparently due to trouble in right hip. No limitation of motion or tenderness about hip. No glandular involvement. Wassermann was negative. X-Ray showed osteochondritis of the upper diaphysoepiphyseal zone of the right femur, thickening around greater trochanter and proliferation about epiphyses. Treated by inunctions of mercury and greypowder, and improved. There was no mechanical treatment.

CASE No. 2. E. M. T.; age, 1 year; white, female, American. Family history suggestive of syphilis. Brought in on account of suppurating sinuses on right hand and left foot. Examination shows mul-

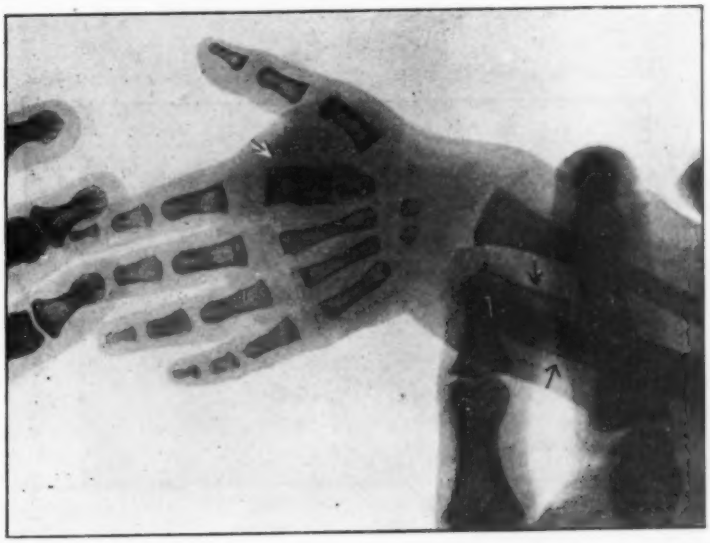


CASE No. 1.—Congenital syphilis.

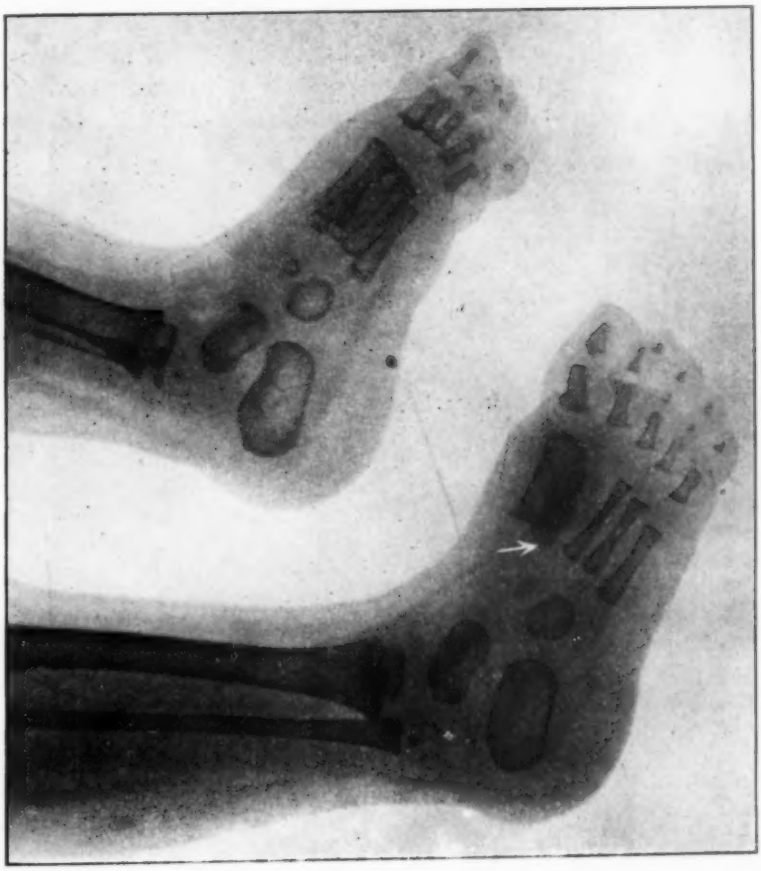
tiple bone lesions. X-Ray shows periostitis and circumferential thickening of right ulna, increasing diameter of bone to three times the normal. Typical syphilitic dactylitis of second metacarpal bone of right hand and first and second metatarsal bones of left foot. Wassermann was negative. Was given inunctions of mercury and salvarsan. Died following salvarsan. The involvement is entirely in the shaft and shows the thickening under the periosteum, the epiphysis not involved.

CASE No. 3. M. F.; age, 3 years; white, female. Family history contains nothing suggestive of syphilis. Brought in on account of sinus on left hand. Examination shows scar from healed sinus over first metatarsal bone, left foot. Sinus discharging over first metacarpal bone, left hand. No glandular involvement. X-Ray shows marked periostitis along entire shaft of left radius. First metacarpal bone of left hand shows marked thickening of entire shaft with proliferation and necrosis. Marked periostitis along shaft of first metatarsal of left foot. Wassermann positive on mother. Treated by mercury inunctions. Improved.

CASE No. 4. C. S.; age, 3 years; white, male, Italian. Family history contains nothing suggestive of syphilis. Child was brought into the dispensary complaining of swelling of the right elbow and a his-



CASE No. 2.—Congenital syphilis. Plate B.



CASE No. 2.—Congenital syphilis. Plate A.

Case No. 3.—Congenital syphilis. Plate B.

Case No. 3.—Congenital syphilis. Plate A,

tory of old sinuses at the lower part of his spine and bow legs. X-Ray shows marked periostitis of an osteoid type, beginning at lower diaphyseal line and involving the lower third of the right humerus. Wassermann positive. The elbow was aspirated and tubercle bacilli were demonstrated by the antiformin method. The patient later died of meningitis. The case was one of double infection.

CASE No. 5. J. M.; age, 7 years; white, male, Italian. Family history negative so far as syphilis is concerned. For weeks child complained of limping and of sinus beneath the right knee. On examination there was present a sinus, as above mentioned, and a dactylitis of the middle phalanx. Did not return for observation. Two years later came back complaining of swelling along both legs. No pain. Began insidiously some months ago. X-Ray shows osteoperiostitis of left ulna, with gummatous area. Lateral view of both tibiae shows osteoperiostitis on the convex side of both, with sclerosis. On left tibia two gummata are shown; on the right, one gumma, all in different stages of necrosis. The anteroposterior view of both tibiae shows circumferential thickening. Wassermann positive. Treated with inunctions of mercury. Improved.

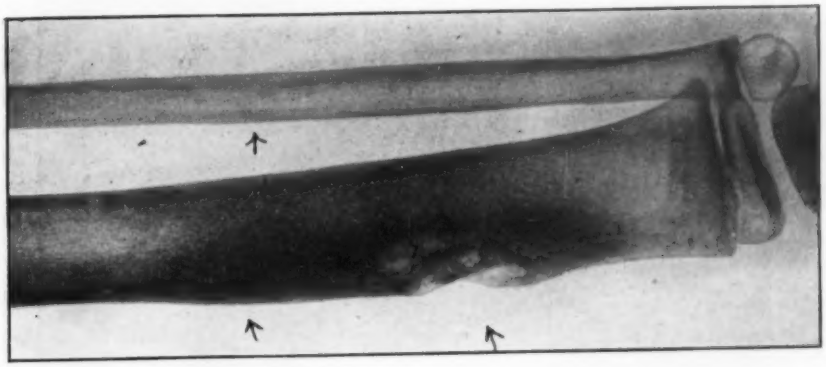
CASE No. 6. F. M.; age, 6 years; white, female, American. Family history is suggestive of syphilis as mother had two miscarriages. Patient began to complain four months ago with pain and swelling about both knees and ankles. Since then she has had trouble in walking; the ankles turned in. On examination, patient had flat feet. Marked thickening of periosteum of both tibiae, chiefly of the left. Knee and hip joints normal. Tonsils enlarged and diseased. Teeth in very poor condition, carious notching of upper central incisors which are pointed toward each other. Not typical Hutchinson teeth. X-Ray shows both tibiae have osteoperiostitis with circumferential thickening and marked sclerosis. On right tibia there are two typical subperiosteal gummata with involvement of upper diaphysis in a rarefying process surrounded by sclerosis. On left tibia there is a gumma in the lower end of the diaphysis. The lower end of left fibula is also involved. Wassermann positive. Treated with mercury. Improved.

CASE No. 7. H. D.; age, 8 years; white, female, American. Family history negative. Patient was brought to hospital complaining of anterior bow legs; no pain. X-Ray shows marked osteoperiostitis, both tibiae, with cortical thickening and sclerosis and obliteration of medullary cavity in places. Plate B. Case 7, shows same tibia after treatment with absorption of nearly all of the periostitis and the medullary cavity more normal. Wassermann positive. Treated with protiodide of mercury and inunctions. Marked improvement in one year. Plate A, left tibia on admission.

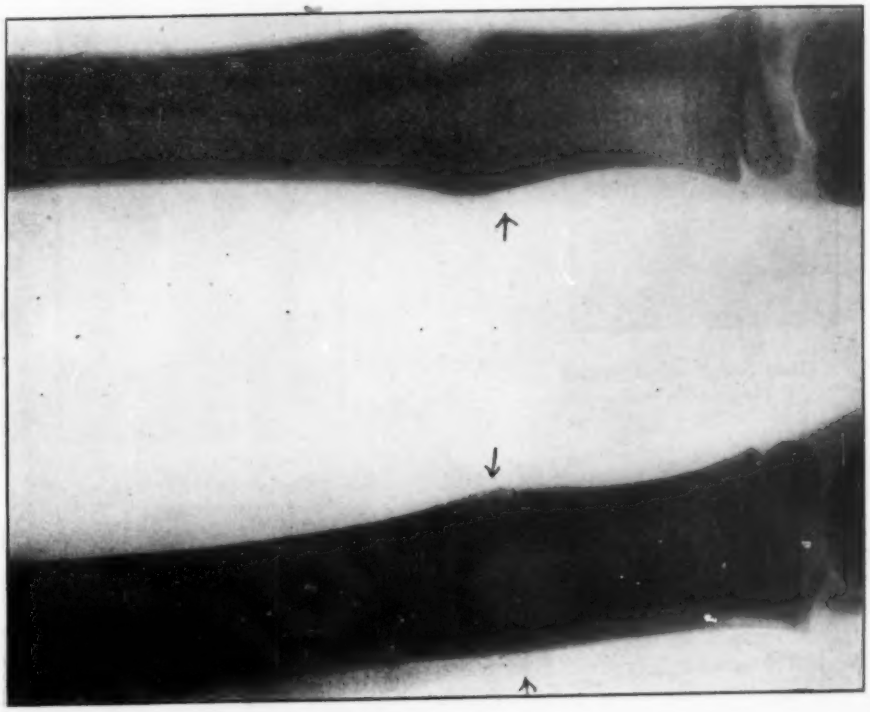
CASE No. 8. S. U.; age, 9 years; white, male. Family history: Nothing suggestive of syphilis Began seven months ago, when he com-

CASE No. 5.—Congenital syphilis with gummatous formation. Plate A.

CASE No. 5.—Congenital syphilis with gummatous formation. Plate B.

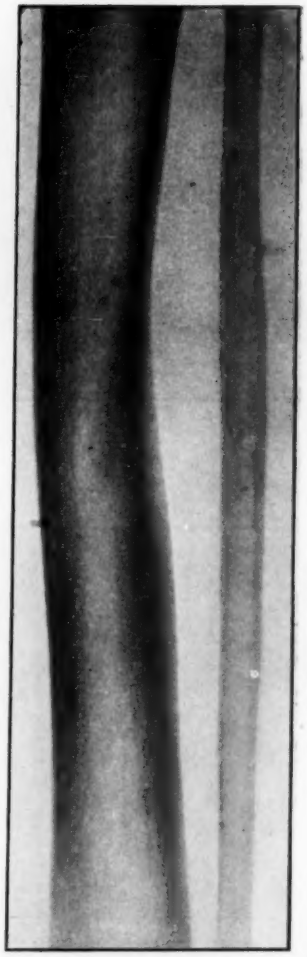


CASE No. 5.—Congenital syphilis with gummatous formation. Plate D.



CASE No. 5.—Congenital syphilis with gummatous formation. Plate C.

CASE No. 7.—Congenital syphilis. Plate A.



CASE No. 7.—Congenital syphilis, one year after treatment. Plate B.

plained of pain in the left knee and could not walk on it. In bed about three weeks and the knee became swollen and broke open, discharging pus. Taken to the hospital three months later, where he remained one month. Amputation was advised. Examination showed the left knee acutely flexed with marked subluxation of tibia, marked swelling and redness of the knee joint, and pus discharging from sinus on inner aspect of joint. Knee very tender, especially over anterior and inner aspect. Limitation of motion in every direction with attempt to move accompanied by marked pain and muscle spasm. Throat normal except for large tonsils. Skin normal. Chest and abdomen normal.

CASE No. 8.—Congenital syphilitic arthritis with gummatous formation. Plate A.

CASE No. 8.—Congenital syphilitic arthritis with gummatous formation. Six months afterwards. Plate B.

X-Ray: Lateral view showed a sclerosis at the lower diaphysoepiphyseal zone left femur with evidence of necrosis and new bone formation. Anterior posterior view showed involvement of internal condyle with gumma formation surrounded by marked sclerosis. The necrotic area communicates with the joint cavity. Wassermann positive and marked improvement under anti-syphilitic treatment consisting of mercury inunctions and potassium iodide. Von Pirquet negative four different times. Plate A—on admission. Plate B—six months afterwards.

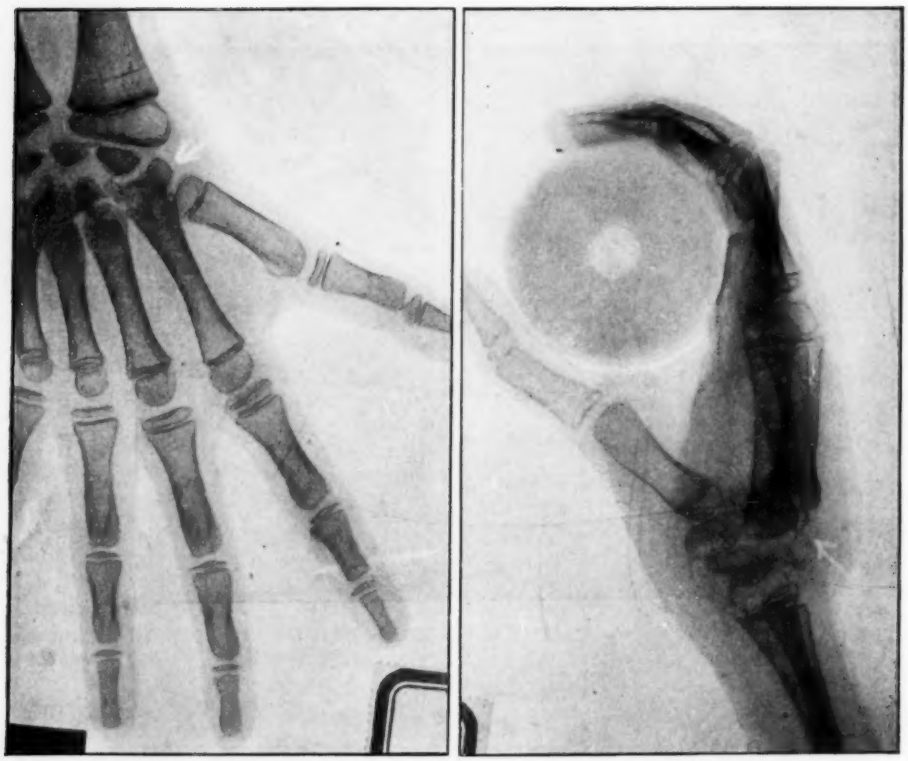
Case No. 9. M. S.; age, 14 years; white, female. Family history: Parents had chronic rheumatism. Began six months ago with pain in the knees. Pain varied in severity, was not increased by walking, but was worse when sitting down at night. Had never been forced to go to bed. Examination showed keratitis. No stigmata of infantile syphilis. Lymphatics—glands in groin and axilla are palpable but the cervical and epitrochlears are not. Right knee—globular shaped swelling on inner side. Enlargement internal condyle of femur. No limitation of motion. Some thickening of capsule and slight swelling on anterior surface right tibia about two inches above ankle. Swelling is tender, immovable, and does not fluctuate. Seems to be periosteal. X-Ray shows sclerotic changes at the diaphysoepiphyseal zone with slight periostitis and apparent enlargement of internal condyle. This agrees with findings of Foundler, who has mentioned enlargement of internal condyle of femur in joint syphilis. Wassermann reaction positive. Improved under anti-syphilitic treatment.

Case No. 10. C. L.: age, 11 years; white, male. Family history contains nothing suggestive of syphilis. Began one year ago with pain in right knee. No history of injury, no pain in any other joint. Pain is intermittent in character, begins in the knee and shoots down to the foot. Pain is mostly at night and worse at night. Knee is tender during attacks of pain. Has always been able to walk, even when pain is present. During pain, feels as if something moved in the knee, but joint never locks and he does not feel anything snap just before the pain leaves. Examination shows no limitation of motion of the right knee and hip, and no pain on motion. There is a tender point at the inner tuberosity of the right tibia. Measurements of right and left knee equal. Reflexes and sensation normal—no stigmata of infantile syphilis of tibia and femur. Proliferative arthritis of cartilage of tibia. Periostitis of patella with sclerosis. Sclerosis of epiphyses of both femur and tibia. Wassermann negative. Improved under treatment. Cannot show plate as roentgenogram was broken.

Case No. 11. A.K.: age 10 years; white, female. Family history contains nothing suggestive of syphilis. Began two months ago, when patient fell, injuring her knee. Two weeks later began to complain of pain in her knee, and limped when walking. Sister noticed her knee was swollen. Pain in knee worse at night. No cough or night sweats. Examination shows right knee swollen, fluid in joint. Limitation of movement at knee joint. Pain on movement. Inner side of

CASE No. 13.—Double infection. Congenital syphilis associated with tuberculosis. Plate A, hip joint.

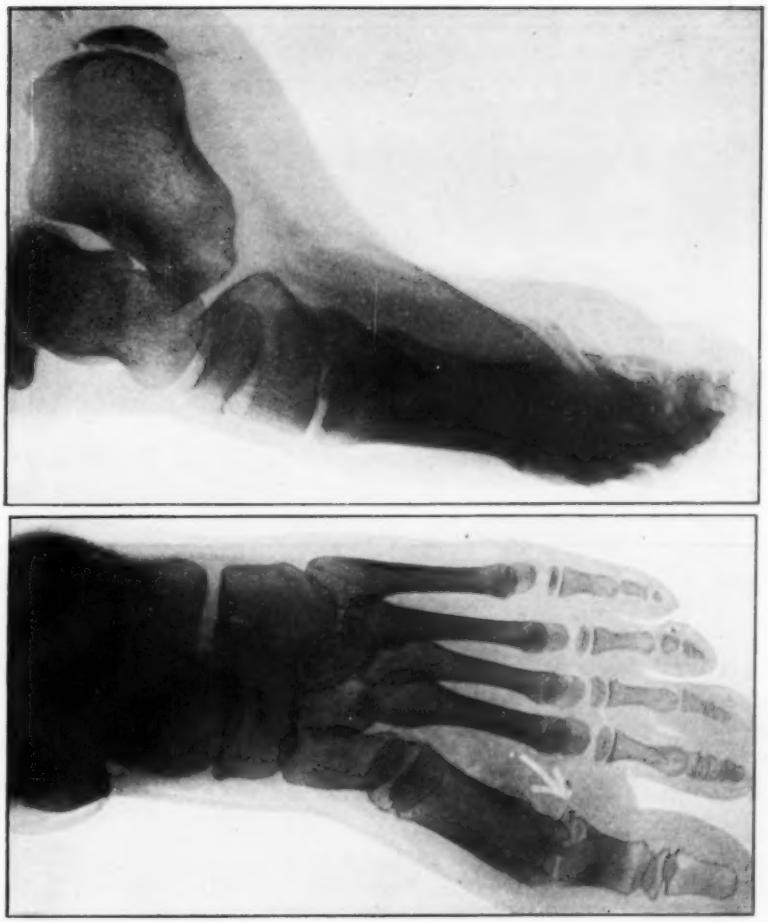
CASE No. 13.—Double infection. Congenital syphilis, associated with tuberculosis. Plate B, spine.



CASE No. 13.—Double infection. Congenital syphilis, associated with tuberculosis. Plate C, carpal and metacarpal.

head of tibia enlarged. Right elbow involved, with limitation of motion and pain on manipulation. X-Ray shows a proliferative arthritis of right knee joint, involving the patellla, which is enlarged and sclerosed, and the internal condyle of femur. There is also a proliferative arthritis of right elbow with a periostitis of the radial tubercle. The shaft of the radius looks suspicious of a periostitis. Wassermann negative. Von Pirquet positive. Case improved under anti-syphilitic treatment.

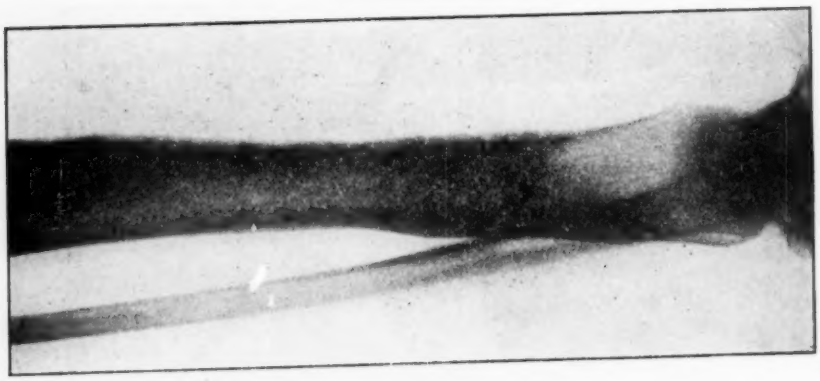
CASE No 12. J. R.: age, 6 years; white, female. Family history contains nothing suggestive of syphilis, except one brother had congenital deafness. Began seven months ago with swelling of hands and difficulty in standing and walking; loss of weight. Later all the joints of all the extremities became stiff and painful. There is a marked sclerosis of the vascular system. X-Ray shows destructive process in carpal bones and the articular surfaces of both ulnas. Also coronoid



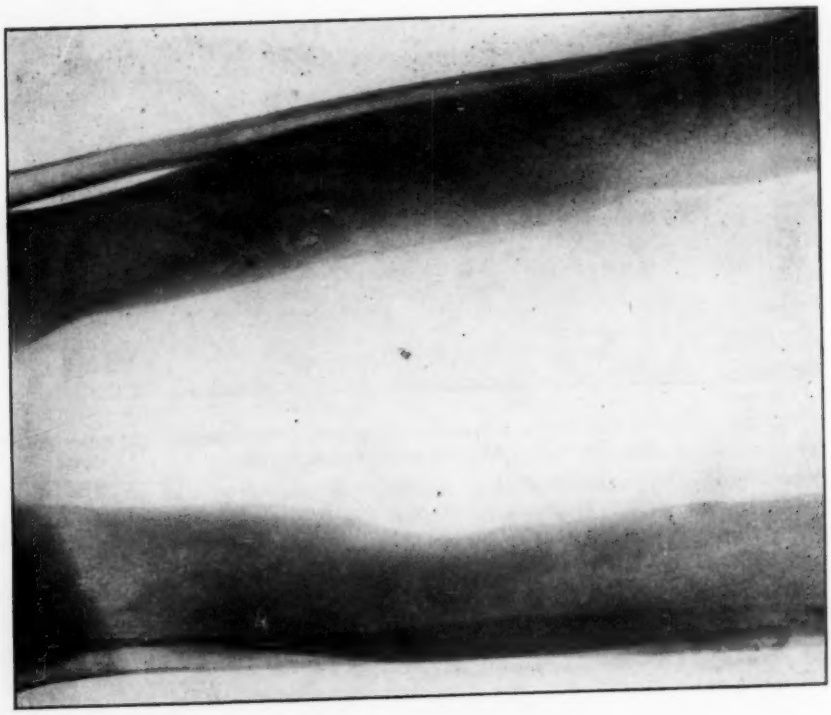
CASE No. 13.—Double infection. Congenital syphilis, associated with tuberculosis. Plate D. Metatarsophalangeal joint.

processes of both ulnas showed a similar process, a suspicion of periostitis of the shaft of the radius. The knee showed sclerosis of both epiphyses with proliferative process and sclerosis of the patella. The picture is one of an infectious arthritis, and is not typical of syphilis —and in presence of a positive Wassermann, was classified as a double infection. Wassermann positive. Treated salvarsan and inunction. Improved.

CASE No. 13. A. S.; age, 10 years; white, female, American. Family history negative. The patient gives a past history of tuberculosis of the lungs and the tarsal and carpal bones within the past 14 months. For the past six months there has been pain in the right lumbar region. State tuberculosis dispensary could find no pathology in lungs. Ex-



CASE No. 15.—Acquired syphilis. Osteoperiostitis. Plate B.



CASE No. 15.—Acquired syphilis. Osteoperiostitis. Plate A.

amination showed no spinal spasm, or involvement of hip joint. X-Ray of spine suspicious of a process of the 10th dorsal vertebra. While in hospital on frame, right hip became swollen and painful. Was in bed with extension to right hip and later sent home with a long spica. Seen six months later; showed a sharp kyphosis of lower dorsal region and a rigid right hip. An iritis had developed, which was reported from the eye clinic as specific. X-Ray: Lateral view of spine shows destruction of body of 10th dorsal vertebra, with apparently new bone formation replacing it; also new bone deposit along the anterior border of the bodies of the ninth and eleventh dorsal vertebrae. Right hip is ankylosed and around acetabular margin and along the ilium is new bone production. Plate of right wrist shows an old arthritis of carpo-metacarpal joints with necrosis of bone. Also at metatarso-phalangeal joint of right big toe. Wassermann negative. Later provocative Wassermann. Improved under antisyphilitic treatment. Another case of double infection.

CASE No. 14. J. S., age, 39 years; negro, male, American. Family history negative. Kicked on leg three to four years ago. Been under anti-syphilitic treatment for one year (potassium iodide). Complains of pain and swelling upper part of leg. Pain worse at night. On examination, large swelling at junction of upper and middle thirds of right tibia. Is tender on pressure. X-Ray: Right tibia shows anterior bowing from osteoperiostitis on convex side of upper half of bone. There is obliteration of medullary cavity and a gumma of tibia. Marked periostitis along fibula. Wassermann positive. Refused treatment.

CASE No. 15. A. B.; age, 27 years; white, male. German. Family history contains nothing suggestive of syphilis. History of chancre three years ago. Two years ago had painful swelling along both tibiae which subsided under treatment. Legs began to swell again two weeks ago and became very painful and tender. Pain much worse at night and patient could not sleep. Examination shows no palpable lymphatic glands. Legs swollen below knees, especially tender along anterior border of both tibiae. Some oedema. X-Ray: Both tibiae showed marked osteoperiostitis with circumferential thickening. Sclerosis and obliteration of medullary cavity in places. Also periostitis along fibula. Wassermann positive. Treatment: Salvarsan. Improved.

CASE No. 16. H. E. A.; age, 30 years; white, male, American. Family history negative. Married; no children, but wife has had no miscarriages. No history of primary sore. Gonorrhea. About ten years ago had growth on lip diagnosed epithelioma, which was removed, with no recurrence. About three years ago injured elbow playing baseball and noticed he could not straighten left arm. Two years ago X-Ray showed exostosis of external condyle of humerus and this was excised. Following this, was well for about one year and able to play baseball. For past two months has had pain in left elbow; worse at night, although always present and of dull character. X-Ray: Marked osteoperiostitis

CASE No. 17.—Acquired syphilis. Syphilitic arthritis.

of external condyle of left humerus with areas of rarefaction and sclerosis and showing previous operation on bone. Also osteoperiostitis of radius and ulna. Wassermann positive. Improved under anti-syphilitic treatment.

CASE No. 17. J. P.; age, 30 years; white, male, American. Family history positive for tuberculosis, but nothing suggestive of syphilis. Has been married ten years. Wife had two miscarriages and then a healthy baby. Chancre 15 years ago with local treatment followed by internal medication for one year. Never had lesions of skin or mucous membrane. Rheumatism in right knee and ankle four years ago, but was not confined to bed. About three years ago developed husky voice and cough, which gradually became worse during past few months. Lost 40 pounds in past three years. About one year ago fell and hurt right elbow. Became so sore he could not work. In hospital, and tubercular elbow diagnosed, and cast applied for two months. Did not improve and at present time joint is much worse. Examination shows right

elbow swollen, hot and tender, and limitation of motion. Cannot extend arm past 45°. Examination of throat shows epiglottis thickened and several small ulcerated patches on upper surface. False cords thickened. X-Ray: Marked osteoperiostitis of right ulna and radius, with sclerosis and necrosis. Also osteoporosis of olecranon process. Wassermann positive. Improved under anti-syphilitic treatment.

CASE No. 18. T. H.; age, 30 years; white, male, American. Family history negative. Married, and wife had two miscarriages. Rheumatism at 14 years of age. Chancre at 18 years. One year ago had a sore, which he called a bunion, on outer side of foot just back of little toe. Had operation in which bone was removed and wound healed slowly. In hospital seven weeks. Shortly after he began to walk, his right ankle and foot began to swell and has remained swollen ever since. Unable to work on account of pain when standing. No glandular enlargement. Examination shows no fluctuation, no redness or tenderness. Feels like bony thickening. X-Ray: Marked sclerosis of tarsus with new bone formation about inner border of ankle and around astragalus. Also periostitis of fibula. Wassermann positive. Improved under anti-syphilitic treatment.

CASE No. 19. C. C.; age, 40 years; white, male, American. Family history negative. History of chancre about 20 years ago. Began one year ago with pain and tenderness in right foot. Has been unable to walk on foot for past six months. Pain not worse at night. Examination shows right foot swollen and tender. No redness or increased local temperature. Limitation of motion in ankle joint. X-Ray shows rarefaction and atrophy of the tarsus and rarefying osteomyelitis of fourth metatarsal bone. No periostitis or sclerosis. Looks more like picture of tuberculosis. Wassermann positive. Did not improve under potassium iodide. Curettement of bone and bismuth paste and then injections of salvarsan. Cured. Fact that potassium iodide made him worse seems to point to bone lesion being tubercular, and the fact that salvarsan, after curettement and orthopædic appliances, cured him, points to syphilis merely as a complication.

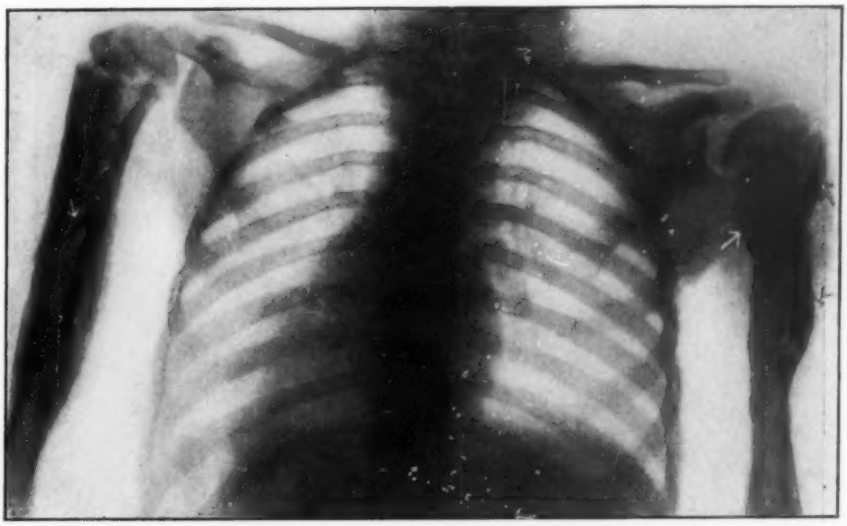
CASE No. 20. M. L.; age, 28 years; white, female, American. Family history negative. Is married but has no children. Hurt left knee nine years ago but soon became entirely well. Six weeks ago struck left knee and small abscess formed in same location and healed. Another abscess formed in same location shortly afterwards and is still discharging. Has always been able to walk. On examination, posterior cervical and axillary glands palpable, but no other. Left knee is swollen, tender, red, and fluctuated, but no flexion. Small sinus on outer aspect of knee and an ulcer over the patella, which is punched out in appearance and communicates with bone. X-Ray: Marked sclerosis of entire patella, with periostitis along border, with new bone formation. Wassermann positive. Cleared up on salvarsan.

CASE No. 21. F. A. K.; age, 35 years; white, male, American. Fam-

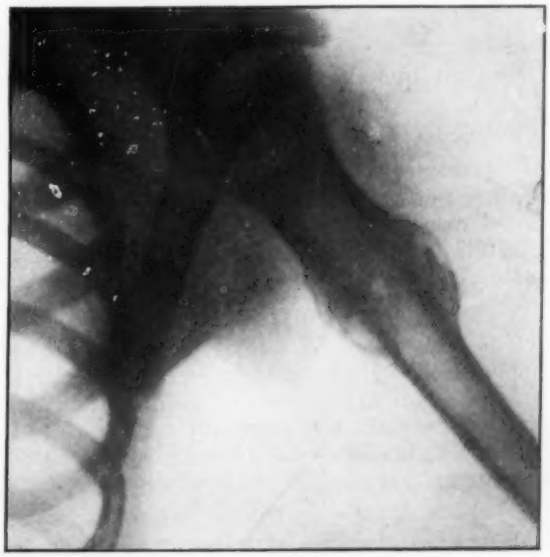
ily history negative. Is married, but has no children. Denies syphilis. General health has been gradually failing for past two years. Has had trouble with stomach for last two or three years, consisting of attacks of pain and vomiting. Had some operation on ankle two years ago for removal of bone. About six months ago had grip. A few days later, while walking in a stiff wind, his left hip felt as though he had sprained it. He noticed an immediate swelling of the hip. His right ankle behaved similarly about the same time. Had cast applied to hip for six weeks. Sputum negative at this time. Since this, has had no treatment except for stomach. Hip and ankle have been gradually getting worse, so that patient is unable to walk without crutches. On examination, Argyll-Robertson pupil was present, reflexes lost, unable to determine Romberg. Left hip was swollen, loose, not painful or red. On movement of joint, no pain or spasm occurred but crepitus felt as if there were loose bone in the joint. The right ankle was swollen, not red, lateral mobility marked, and there was bony enlargement around the ankle. X-Ray showed marked production of new bone along outer border of fibula and marked periostitis along both tibiae and fibula of left leg. Also necrosis with new bone formation of astragalus and internal cuneiform bones and pathological fracture of the os calcis, with sclerosis. New bone formation around left hip. Wassermann not taken. Has improved under local orthopedic treatment in conjunction with anti-syphilitic treatment.

Case No. 22. W. F. D.: age, 59; white, male, American. Family history negative. Is married and has one son, apparently healthy. History of chancre 20 years ago. About five months ago, while lifting a heavy object, injured back and has been unable to work since. About one month following injury, noticed weakness in right leg. Could not walk as well as usual. No pain in legs on walking, at times rheumatic pains. Shortly afterwards noticed weakness in left leg. Lately has noticed curvature of spine. On examination patient stands as if spine were settling down into abdomen. Walks poorly. Spine curve posterior and to right side in lumbar region. Lower part of abdomen is ballooned from paralysis of muscles. Lower limbs are atrophic, resembling muscular dystrophy. Can move legs in all directions but much weaker than normal. Knee jerks absent, Argyll-Robertson pupil present and other signs of preataxic stage of tabes dorsalis. X-Ray shows apparent crushing of second and third lumbar vertebrae on left side, with new bone formation and proliferative periostitis of fourth lumbar vertebra. Wassermann: None taken. Orthopedic treatment of spine.

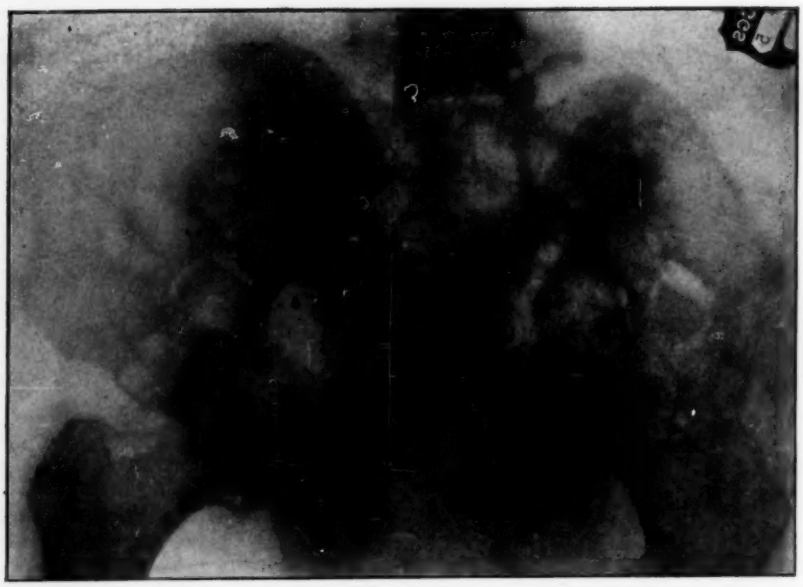
Case No. 23. Osteomyelitis of humeri. George A., six years old, American, colored child. Swellings of both arms, slightly painful, about a year's duration. Physical examination shows a spindle-shaped swelling at junction of upper and middle thirds of each humerus, encircling the arm; here and there points of fluctuation can be made out. Clinical diagnosis of syphilis was made on account of insidious, non-painful symmetrical growth. Wassermann negative. X-Ray shows chronic osteomyelitis. Right arm: entire right bone is affected, giving a moth-eaten appearance. There are areas of sclerosis which are not regular,



CASE No. 23.—Osteomyelitis—humeri.



CASE No. 24.—Sarcoma of the humerus.



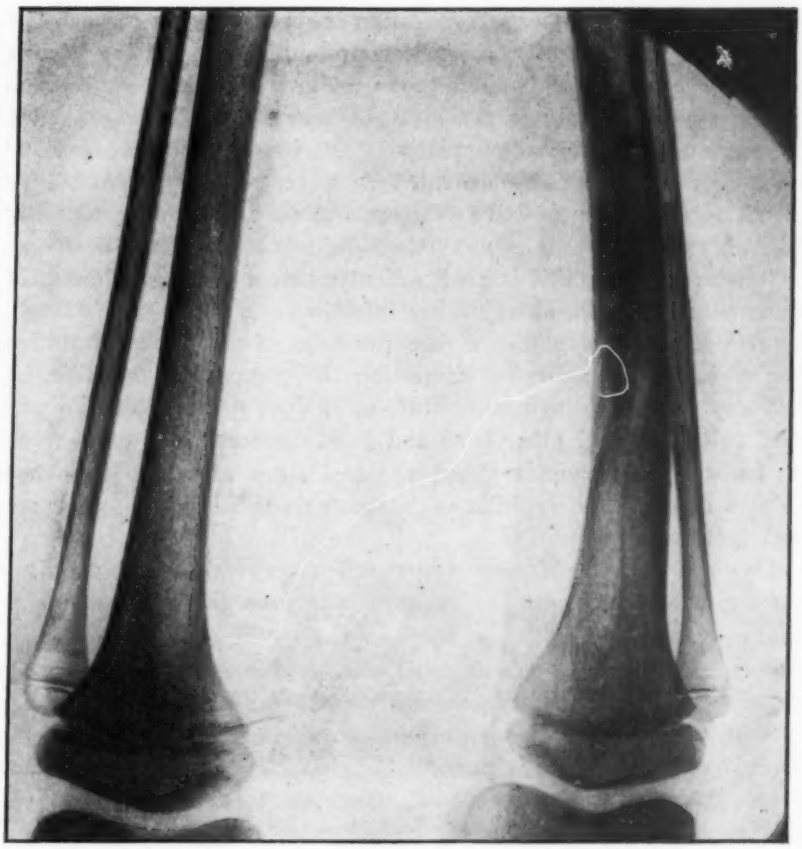
CASE No. 25.—General carcinomatosis—pelvis.

but interrupted by areas of necrosis; also shows three or four sequestra. Left arm: entire bone diseased, areas more sclerosed, a great many areas of necrosis and sequestra; also notice considerable periostitis; as differentiated from syphilis the sclerosis is not so dense, sequestra has involvement of the center of the bone and also the epiphysis. Operation confirmed diagnosis. Pure culture of staphylococcus aureus was found.

CASE No. 24. Sarcoma, central shaft of humerus. Boy, 8 years old. Three months before noticed slight swelling on humerus, not very painful, was diagnosed exostosis. X-Ray shows spindle- shaped tumor involving the medulla and with a transparent process extending out through the cortex, destroying the bone and pushing the periosteum forth.

CASE No. 25. Female, aged 55. Six years ago had amputation for scirrous carcinoma of the breast. Fairly good health for three and one-half years, then she began to complain of pain in the lumbar spine and sacro-iliac region. The pain was constant and she soon became bed-fast. The radiogram showed extensive bony changes in the pelvis, spine and ribs. The process was one of destruction without any attempt of regeneration.

CASE No. 26. H. B., aged 9. History of swelling of the legs and pain worse at night. Wassermann positive. X-Ray shows periosteal thickening on the concave side. This case is an exception to Dr. Lovett's statement as detailed under Differentiation from Rachitis.



CASE No. 26.—Syphilis of bone with thickening on the concave side of bone.

CONCLUSION.

1. That syphilis of bones and joints has been largely overlooked in the past from the relatively small number of cases in our hospital records and in the literature. This is naturally more noticeable in the period before the x-ray and Wassermann were in general use. At the present time we exclude syphilis either as a primary or complicating factor, in all cases of bone and joint disease.

2. Syphilis is often present as a complicating factor, or may be merely coincidental, in cases where the bone or joint disease under consideration has some other etiological factor as tuberculosis, osteomyelitis, or rachitis, so that a history of syphilis, the presence of other manifestations of the disease, or a positive Wassermann does not prove that the

bone or joint disease under consideration is syphilitic. In our case No. XIX., a positive history of syphilis was present and a positive Wassermann, but the patient did not improve under antisyphilitic treatment, but became progressively worse, and the bone disease later proved to be tuberculous. A tubercular spine did not improve under treatment, and syphilis was later demonstrated as a complicating factor. One must not forget that a positive Wassermann on one hand or a positive von Pirquet on the other is not *prima facia* evidence that the disease alone exists: that syphilis is an excellent medium for the implantation of tubercular infection, or any other infection.

3. A history of syphilis or the presence of other manifestations of the disease is of value in suggesting the presence of syphilis, but not of any absolute diagnostic value, as it does not exclude the presence of tuberculosis or other bone and joint diseases.

4. In studying symptoms and physical signs alone we have been unable to differentiate syphilis of joints from those due to other etiological factors.

5. We consider the Wassermann reaction very valuable, but only as one point in the diagnosis. In many of our cases the Wassermann reaction was negative, and they were undoubted syphilis, as shown by the x-ray, and their response to antisyphilitic treatment. We have also cases in which the Wassermann was positive and in which the cases proved to be some other bone or joint disease. In some of these cases syphilis was undoubtedly a complicating factor because improvement was not marked until antisyphilitic treatment was instituted. A routine Wassermann is taken on all our cases of bone and joint disease, and in those which are negative but in which the clinical symptoms or roentgenograms suggest syphilis, a provocative Wassermann has been found in some cases.

6. We have found the luetin test of value also, as it is sometimes positive when the Wassermann reaction is negative.

7. The finding of a negative von Pirquet in doubtful cases is of value.

8. We consider the roentgenogram the most valuable factor in the diagnosis of syphilis of bones and joints and in differentiating it from other conditions. In one of our cases there was a history of a primary infection and the Wassermann was positive, but the roentgenogram showed nothing suggestive of syphilis but was suggestive of tuberculosis. On section of bone and pathological examination it was reported tuberculosis. In our cases we have not found syphilitic arthritis without bone involvement, as the roentgenogram of the joint involved may

show nothing, while a roentgenogram of other bones or those contiguous to the joint may show a typical syphilitic osteoperiostitis. In one of our cases where the knee was complained of, a roentgenogram showed typical syphilitic involvement of the radius and ulna. In studying the roentgenogram of cases we have been unable to discern any difference between acquired and congenital cases, with the possible exception of congenital syphilitic osteochondritis.

9. The so-called therapeutic test is also of some value in the diagnosis of obscure bone and joint lesions where an absolute diagnosis cannot be made from the clinical and laboratory findings.

In 38 cases of bone and joint syphilis, 22 cases were congenital and 16 were acquired. In 34 cases having x-ray examinations, only 8 cases had an involvement of one bone alone, and 16 cases had involvement of joint as well as bone.

TABLE I.

CLINICAL DATA	Present	Absent	FREQUENCY OF BONE INVOLVED	No. of Cases	FREQUENCY OF JOINT INVOLVED	No. of Cases
History of trauma	6	32	Tibia	22	Knee	7
History of pain	24	14	Fibula	11	Elbow	6
Osteocopic pain	13	25	Femur	9	Ankle	5
Redness	4	34	Radius	9	Hip	4
Swelling	18	20	Ulna	9	Wrist	4
Hydrops	3	35	Humerus	7	Tarsal	4
			Patella	6	Tarsometatarsal	1
			Tarsus	5	Upper radio ulnar	1
			Metacarpus	5		
			Vertebrae	4		
			Metatarsus	3		
			Phalanges.	2		
			Carpus	2		

In one of these the luetin test was positive.

TABLE II.

X-RAY FINDINGS	Present	Absent	WASSERMANN REACTION	No. of Cases
Periostitis	26	8	Positive	24
Cortical thickening	22	12	Negative.	8
Proliferation of bone	19	15	Doubtful.	2
Circumferential thickening	13	21	Not taken	4
Destruction of cartilage	13	21		
Necrosis	11	23		
Rarefaction	7	27		
Gumma	4	30		

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CLONIC SPASMODIC CONTRACTIONS, ILLUSTRATED BY A CASE OF CLONIC SPASMODIC CONTRACTION OF THE MUSCLES AROUND THE HIP JOINT.*

BY E. LAMING EVANS, F.R.C.S., LONDON.

MR. PRESIDENT AND GENTLEMEN:

AFTER the many learned papers read before this Association at yesterday's meeting, I place before you, today, with very great diffidence, a problem which in part belongs to orthopædic surgery and in part to neurology. My excuse for bringing it before your notice is, partly, on account of its rarity, partly on account of the principles underlying the treatment, and, in some measure, on account of the success which, up to date, has attended the treatment. The case is one of spasmodic snapping hip.

E. W., aged 21, was first seen by me in October, 1914. She complained of pain on the outer side of the upper part of the left thigh. During 1911-1913 she had been treated by Scott's dressing and a leather splint for an affection of the left knee, at two metropolitan hospitals.

The condition of the left hip, namely, swelling and tenderness below the middle of Poupart's ligament, together with the report that the x-ray examination showed erosion of the head of the femur, in conjunction with the history of the affection of the left knee, led to the diagnosis of suspected tuberculous coxitis. She was treated for three months in an infirmary and for one and one-fourth years in a sanatorium.

I next saw this patient in November, 1916. She then presented a complete change of symptoms. All movements of the hip joint were free and there was an absence of all swelling in or around the joint. When the hip joint was in the position of extension, that is, when the patient was standing up or lying flat, movements of internal rotation of the femur occurred, and each movement was attended with an audible, visible, and palpable snap. The movements were produced by the internal rotators of the hip joint, and the snap was caused by the great trochanter passing under the anterior fibres of the gluteus maximus. The contractions were of spasmodic character: abrupt, as if produced by an electric current: painful; were not stopped by her will, attention or distraction: occurred as frequently as 49 times to the minute: and ceased when the hip was flexed and abducted.

The case was one of clonic spasmodic contraction in which the reflex arc consisted of the afferent or sensory fibres from the anterior

* A paper read before the British Orthopædic Association, July 27, 1918.

fibres of the gluteus maximus, or hip joint, a spinal centre, and the efferent or motor fibres to the internal rotators of the hip. It was distinguished from the spasmodic tics inasmuch as the movements were characterized by extreme abruptness, lack of purpose, the limitation of the anatomical area, their painful character, the absence of any irresistible impulse and of the sense of satisfaction upon consummation.

The cause in clonic spasmodic contractions has to be sought in some irritation in the reflex arc: and inasmuch as the motor impulses ceased when the thigh was flexed and abducted, it was reasonable to assume that the irritative lesion was not present in the course of the efferent fibres to the gluteus medius and minimus, nor in the spinal cord: and, as this position relieves tension of the anterior fibres of the gluteus maximus upon the great trochanter, it was safe to assume that the course of stimulation arose in the afferent fibres from the hip joint or the gluteus maximus.

In January, 1917, the leg was fixed in plaster-of-Paris with the thigh abducted and slightly flexed. All spasmodic movements were checked. The plaster was removed in May, 1917, when the movements returned and continued.

In November, 1917, hypnotic suggestion failed to relieve the condition.

In January, 1918, I operated, exposing the tensor fasciae femoris, and dividing it transversely together with the anterior fibres of the gluteus maximus. The muscles were dissected upwards and the nerve supply exsected as far as they were exposed. At the operation nothing abnormal in the anatomical arrangements of the tensor fasciae femoris nor of the gluteus maximus were found. The spasmodic contraction produced the same signs as a snapping hip in which various pathological conditions have been described—thickening of the ilio-tibial band—adventitious sausage-shaped masses of tissue, or bands connecting the gluteus maximus to the ilio-tibial band. But none of these conditions was found.

The immediate result of the operation was a cessation of all spasmodic movement, which has continued to the present time. I here show you the patient.

The case presents several points of interest to the orthopædic surgeon. So far, nothwithstanding a fairly extensive search into the literature of snapping hips and clonic spasmodic contractions, I have failed to find any similar case. In Heully's exhaustive articles on "Hanche à ressort" he quotes a case by Rochet of voluntary tic or

habit spasm, associated with snapping hip, but the original description in the *Journal de Bordeaux* is not available for reference in the Royal Society of Medicine Library: but it was clearly a case of tic and not spasmodic contraction.

The cause of the afferent stimulus is speculative. The previous history of the case might lead to the supposition that the exciting cause of the reflex spasm was in the hip joint after cure of an arthritis which may or may not have been tuberculous in nature. The explanation of the cure must then be sought in the lessened intra-articular pressure by the relief of tension upon the great trochanter by division of the anterior fibres of the gluteus maximus. On the other hand, the afferent stimulus may have arisen in the gluteus maximus, though nothing abnormal was seen at the operation. Like many cases of spasmodic torticollis of subcortical or bulbar origin, the reflex arc was established without demonstrable lesion, but unlike those cases which are treated and cured by exsection of the efferent or motor nerves along which spasmodic impulses pass, in the case under review, cure was effected by relief of tension of the efferent or sensory nerves conveying the afferent impulses to the centre of the arc, and without interference of the normal function of the muscles which carried out the spasmodic movements.

DISCUSSION.

THE PRESIDENT: This is a very interesting case, and Mr. Laming Evans gave me an opportunity of seeing the patient when the movements were most marked, when it almost seemed that the head of the femur was slipping over the bony ridge, and we both seemed in some doubt as to what had happened. The curious thing about it is that the movements are those of internal rotation, and the operation which cured it apparently did not deal with any internal rotators, and it is a question whether it was not cured by the fact of operation, and, therefore, whether any long incision would not have cured it. At any rate, the treatment adopted by Mr. Laming Evans was entirely successful, and the patient is none the worse for having a bit of the gluteus maximus and tensi femoris divided.

LIEUT.-COL. MACDONALD (New Zealand Medical Corps): I have recently had a case which was practically on all fours with this one, except that the muscles affected were not the same as in this case. In the case I speak of, the origin, I think, was toxic. The condition came on whilst the patient, a soldier, was recovering from typhoid fever. It seemed to bear a definite relationship to a toxic cause. The muscle affected in that case was the rectus abdominis, and the movements took place at about the same rate, and could not be controlled by the patient. They varied from 45 to 50 per minute and were not accompanied by pain. During the time the movements lasted, about four months, the patient suffered from an acid form of indigestion. One peculiar point about the case was that every third or fourth contraction was accompanied by a contraction of the internal oblique. I treated it as a functional case, and my reason for that was—and I think it is a fairly sound one—that when there is a rhythmical contraction of muscle, if it is not most marked at the extremity

of the limb or body, you can be pretty certain it is functional; for instance, if it affects only the muscles near the large joints. I think the condition in this present case also is functional. The method of treatment I used was that which I adopt in all such conditions. It began with strict isolation. The patient was put on milk and water and was isolated; he was not allowed any external stimulant, nor was he allowed to read, or work or smoke, or do anthing but think about himself. After a week of that preliminary treatment the patient is brought into a receptive condition, and more forcible treatment is given. I began to tetanize with a tetanizing coil the rectus abdominis. After a few minutes of that, the muscle lost its contraction. The movements continued during sleep. I do not know whether that was so in Mr. Laming Evans' case. Each day the improvement lasted a longer time, and in about a week the contractions ceased and the patient became practically normal, although occasionally, under the influence of excitement, the trouble recurred, when he could now check it. I think dealing with spasms of any kind, either tonic or clonic, by the method of plaster or fixation, is not a good plan. I think there are two ways of dealing with these conditions, which are useful. One of them is that which I have indicated, by a preliminary course of isolation, then applying some local treatment which will have some effect on the muscles. In the case of tonic spasm, a good plan is slow re-education of the opposing muscles by a stimulus. In cases of contraction of the hand, which used to give a great deal of trouble, I have got success in practically all cases by using strong faradization of the contracted muscles which are in spasm and then applying gentle faradism to the opposing muscles, getting the patient to make an effort to help himself. From the moment the patient helps himself, you are on the road to success and you can be certain you will arrive at a cure.

MR. LAMING EVANS (in reply): Against the functional theory is the fact that when my patient flexed and abducted the leg the spasm ceased. If it had been functional, I think the spasm would have gone on in any position. With regard to persistence during sleep, the patient says unless she got the leg adducted and flexed, it was too painful for her to sleep, but in that posture she could sleep. I did not mention the fact that we could not isolate these girls; we had no beds available. Even in England, now it is most difficult to isolate neurotic patients. She was treated by means of the faradic brush and in other ways as if her case was functional, for a considerable time, but it did not improve her. I think the fact that it persisted so long, and also that it was rather painful, are against the functional idea, as also the fact that there was a history of coxitis. It seems to indicate that there is some source of irritation in the reflex arc.

THE MENSURGRAPH: A METHOD OF MEASURING AND PLOTTING ORTHOPÆDIC DEFORMITIES BY PHOTOGRAPHY.

BY THERON WENDELL KILMER, M.D., NEW YORK.

THIS method consists in using the photographic camera as an instrument of precision the same as a surveyor uses the transit.

A white stool (Fig. 1) has painted upon it two sets of black footprints. One set faces towards the front, while the other set faces at right angles to these. A person standing upon the first set would, therefore face the camera, while a person standing upon the second set would be sideways, or profile, to the camera.

The camera is placed at a fixed distance in front of the stool. This distance is determined by experiment, the focus of the lens used being an important factor in determining the above distance. I found that with a lens of nine and one-half inches focus that the camera must be exactly one hundred and twenty-four inches, or ten feet and four inches, in front of the stool; it also was found that the camera must be exactly forty-nine and one-half inches from the floor. These dis tances are carefully measured, two small tacks being driven into the floor, said points located by means of a plumb-bob attached to camera and to the stool. These two points must be exact in order that the number of inches on the person correspond relatively to the number of inches on the ground-glass of the camera. It was found that a child measuring four feet and five inches, if placed on the stool, would measure four inches and five-twelfths when measured by a rule on the ground-glass of the camera. Across the front of the white stool were painted two black lines (Fig. 1), one horizontal and the other dropping vertically from the horizontal line. Upon the ground-glass of the camera there were two similar lines which accurately cover the lines on the stool. By this means I know that my ground-glass and subject are always in register, similar to the cross-hairs of a surveyor's transit coinciding with the cross-lines on the rodman's target. After photographing the child upon a five by seven plate, I place over the negative in printing, a screen or scale (Fig. 2). This screen consists of a

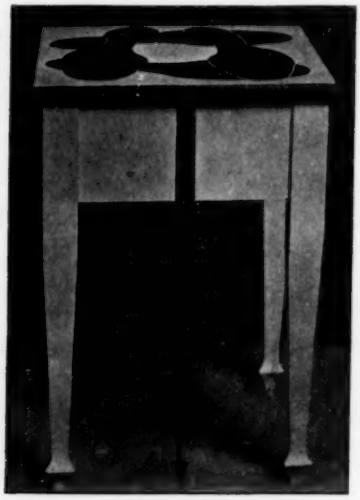

FIG. 1.

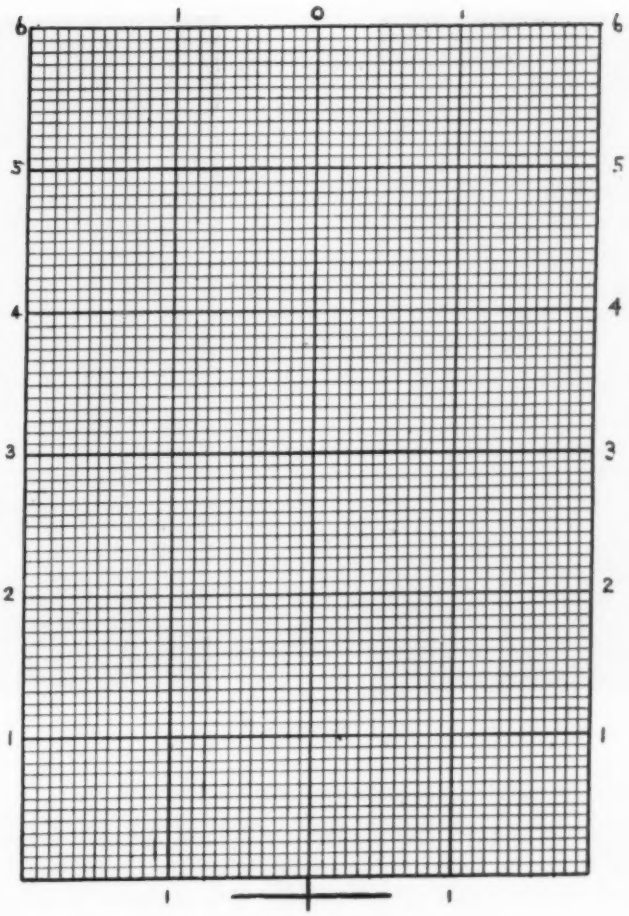

FIG. 2.

semi-opaque substance upon which are drawn transparent lines. The two cross-hair lines on the screen are placed in register with the cross-hair stool lines on the photographic plate negative. The result is a scale of square inches upon the child corresponding to the number of square inches on the screen; negligible errors are practically eliminated, as the cross-hair lines of the plate and screen always match up. Looking at Fig. 3, we see that the height in inches is fifty-three, or four feet and five inches, which corresponds to the height of this child when measured by a measuring rod. Notice in Fig. 3 how both positions of the child are of the same height, showing the accuracy of the method.

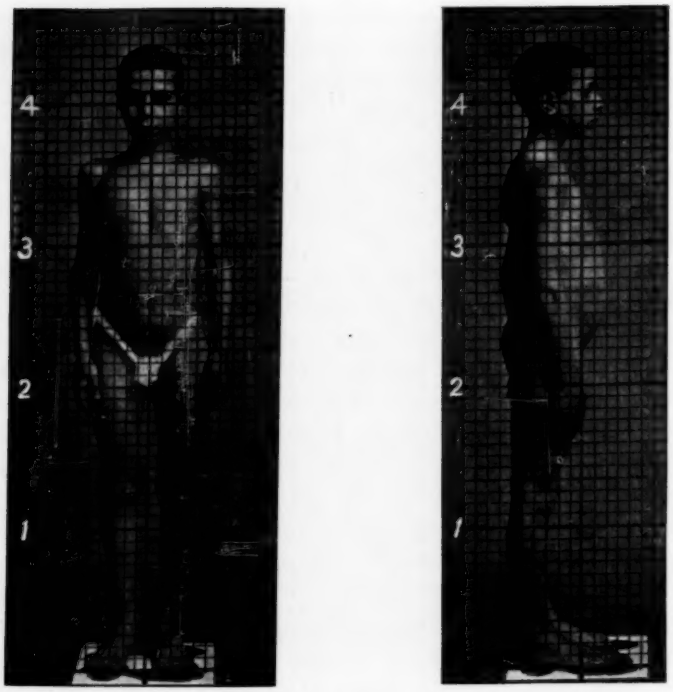

FIG. 3.

These measure-picture records which I have termed mensurgraphs, would seem to me to be of value in denoting the progress of improvement of orthopædic cases of all types. For instance, a stooping attitude and its correction might be very graphically shown in lateral pictures, with the difference of the line of balance in the two postures. An anchylosed knee may be illustrated, and its improvement may be shown better by use of this screen method of plates than by any number of tape measurements. Incorrect postures at a school desk may also be recorded by this method. The use of the ruled screen does not in any way mar the value of the photograph, as the child is not taken through the screen, but the screen is superimposed upon the photograph.

Let us for a moment look again at Fig. 3. Suppose it be desired to take even a finer measurement of any individual portion of this subject: a knee, arm, face, etc. Let us take the face, for example. The face, from top of head to point of chin measures eight inches; if you count the squares between these two points you will find that there are

FIG. 4.

eight of them. We now take the negative and make an enlargement of the head, which enlargement, when measured by rule upon the enlarging-easel, is to be exactly eight inches. After obtaining this enlargement, we place upon it a large, ruled screen divided into square inches, each square again divided into twelfths of an inch. In Fig. 4 we see this enlargement and screen combined. By this enlarged method we are able to measure developmental changes, deformities, growths, skin lesions, etc., by one-twelfth of an inch, thus having a method of permanently recording any change in size. In conclusion, this method of mensuration by means of photography seems to me to offer a new field of great value along orthopædic lines, namely, those of being able by the mensurgraph to permanently record the measurement of growth, deformity and development of the human body.

METACARPAL AND PHALANGEAL TRACTION SPLINT.

BY HENRY L. HESS, M.D., KANSAS CITY, MO., CAPTAIN, M. C., U. S. ARMY,
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In the treatment of fractures occurring among war injuries the predominance of compound comminuted fractures is the most striking feature. In dealing with this type of injury many new problems as to proper appliances have arisen which have led to the suggestion of a number of new and valuable devices. For one group of these fractures, namely, those of the metacarpals and phalanges it has occurred to me that a more practical appliance than that heretofore used could be devised.

As many of these fractures are infected and require frequent dressing, the same recognized principles of treatment should be instituted as in the case of similar fractures of other long bones, namely, that of traction. This traction should also be applied in such a manner that the best results may be obtained with the least possible discomfort to the patient.

With this point in view I have attempted to devise a finger traction splint by means of which these results may be accomplished without

immobilizing the entire arm, allowing the patient free use of the arm, and permitting frequent surgical dressing, without disturbance of the fragments.

The splint, which is interchangeable, right or left, is constructed of heavy steel wire No. 5 (Roebling gauge), with a padded collar through which the fingers are admitted. On the ulnar side of the hand, the collar rests on the styloid process. On the radial side it rests between the thumb and index finger, which point is a natural weight-bearing surface. From this latter point on the collar arises the extension arm of the splint, which projects to two inches beyond the ends of the fingers, where it is bent at right angle and overhangs the tips of the fingers. Here a backward loop is made which forms an elongated eye through which the traction cords are passed, thus avoiding pressure on the ends of the fingers. This extension arm can be adjusted in such a manner as to procure traction on any one or on all of the fingers. The traction cords are attached to the dorsal and palmar surfaces of the finger by means of adhesive plaster, and are then passed through the elongated eye of the extension arm, crossing within the eye, and again above the eye where they are tied. Traction is obtained by twisting the traction cords by means of a small stick or nail inserted between the cords immediately above the eye of the splint. When sufficient traction is obtained, the stick or nail is secured to the splint by means of adhesive. A cotton pad should be applied over the dressing on the palmar and dorsal surfaces of the hand, and made secure with a bandage.

The accompanying photographs, for which I am indebted to Lt.-Col. W. M. L. Coplin, show the splint applied to the ring finger of the right hand.

GUNSHOT INJURIES TO THE JOINTS.

BY ROBERT B. OSGOOD, LIEUT.-COLONEL, M.C., BOSTON.

In discussing gunshot injuries of the joints, certain fairly recent changes of conception regarding the resistance of the synovial membrane must be borne in mind.

No one will question the serious nature of synovial infections. When they occur, the constitutional effect is often profound and the treatment is difficult.

It is a fact, however, already familiar to surgeons who have done much joint work, and emphasized very strikingly by the great number of gunshot wounds of the present war, that the synovial membrane and joint structures possess very marked resistance to infection. If the invasion does not contain an overwhelming number of bacteria and appropriate treatment be instituted early, the synovia may be counted on to take care of the residual infection. With proper after-treatment, joint function may be confidently expected also.

Principles Underlying Treatment.

The principles underlying the treatment of joint injuries concern themselves first with transport of the wounded. In transport the importance of gentleness and most complete fixation, coupled, if possible, with traction, cannot be over-estimated.

No man whose wounds suggest the possibility of any joint involvement should be allowed to leave the battle field or the first dressing station where splints are available without the most adequate protection of his potentially dangerous injury.

In the upper extremity, Murray's hinged modification of the Thomas leg splint, slung to a stretcher bar, and, in the lower extremity, the Thomas leg splint, offer this adequate protection, affording not only fixation by means of slings and flat splints and side bars, but also integral traction by means of adhesive extension straps fastened about the notch in the lower end of the splint pulling against the bony counter point in the groin or axilla. In the arm only slight traction is ever necessary. In the leg, more traction is advisable, but if the extension is applied early, before the muscle spasm has become severe, much less force is necessary than if it is applied for the first time at a later period. The leg should be flexed at the hip and the splint slung on a stretcher bar, as with the arm injuries.

In case of extra or intra capsular hip injuries, the long Liston splint, interrupted by an iron bridge, by the bending of which abduction is secured, may be used for transport only. If this is employed, it should be made into a traction splint, by means of a perineal band passing through the holes at the top of the splint, while by means of anklet or extension straps, traction is maintained to the adjustable foot piece.

We should make no compromise with slings, angular arm splints, posterior leg splints, etc., etc.; fixation, plus traction, is the only safe rule to follow in the transport of joint injuries.

Serving with the British it has been our repeated experience to receive at the General Hospital seriously inflamed joints in which the necessity for an extensive secondary operation seemed imminent, which were shown by the records to have left the casualty clearing station, or evacuation hospital, in an excellent quiescent condition. These usually were transported in posterior wooden splints, with foot pieces; the thigh and toes were fixed, but the leg had twisted invariably; and added to the imperfect immobilization, there was often undue constriction, unevenly distributed. If we were able to attend to these cases quickly and apply a Thomas splint with traction and fixation, most of these threatening joints quieted down after a stormy two or three days. Continuous fair weather might just as well have been enjoyed if they had been properly splinted nearer the front.

FIXATION.

After transport, the traction and fixation should be continued, coupled usually with hot fomentations. We are speaking now of those joints which have had the initial cleaning operation, the so called debridement. This fixation and some degree of traction should be maintained until the temperature drops, the surface heat and swelling become less intense, the patient once or twice a day being encouraged to make slight active motions of his joint. Varying degrees of fixation should be continued for parts of the day and always at night, as function returns.

EARLY OPERATION AND CLOSURE OF THE SYNOVIAL CAVITY.

All through the early years of the war, the problem of the treatment of wounds was the problem of sepsis. It is a problem still, but it is a problem which seems in a fair way of being solved. Some late sepsis is bound to occur, but may be fairly well controlled by the Carrel-Dakin treatment if the solution is fresh and properly made and the

technique is carefully followed. By far the most important contribution to the solution of the problem of infection in joint wounds is what is known as the technique of early closure.

It has been demonstrated by Lemaitre and others that a very large proportion of all wounds may be safely closed by primary suture, if by a careful and non-destructive dissection all the devitalized traumatized tissue be removed within a few hours of the reception of the wound. By a few hours is meant from five to twelve. Certain other wounds operated upon later than this may be dissected and provisional sutures placed, and a large proportion of these closed by delayed primary suture. Many of the frankly septic wounds may be treated by the Carrel-Dakin method and when the smears from the depths show only one or two bacteria to the microscopic field, may be safely closed by secondary suture.

The important measures in joint wounds, if the case has been received before frank and extensive suppuration has set in, are: (1) the careful removal of all the devitalized tissue by the technique described by Lemaitre. (2) The removal of the foreign bodies, clothing and missiles, by following with the utmost gentleness and avoidance of trauma to the uninjured tissue in the trail of the missile, and, (3) the thorough and prolonged washing-out of the synovial cavity, after the removal of the foreign bodies. The solution used seems not to be of supreme importance, saline, ether, eusol, weak bichloride, sterile water, seem to give the same results. It is the thoroughness of the irrigation, reaching all the recesses of the joint, that counts. A soft rubber catheter serves well, and may be inserted, in case of a single opening, into the opposite side of the joint and moved about gently into the deepest recesses, the fluid being allowed to escape from the opening by the side of the entering catheter. The edges may be gently closed about the catheter, while the fluid is allowed to flow in, and the synovial cavity slightly ballooned, then the fluid is allowed to escape quickly by releasing the edges of the wound. There must be a large enough opening in the synovia to allow free escape of the fluid and pieces of clothing or small bone fragments. The irrigation should last from ten to fifteen minutes.

Following the dissection and the thorough irrigation, the synovia is tightly closed with interrupted catgut suture, and, if the case has been received within a few hours of the injury and the extent of damage of the superficial tissues is not too great, these structures are sutured as well. In any event, the small rubber tissue drain is inserted only down to the synovia, but not into the synovial cavity. In the cases received later, the Carrel-Dakin tubes may be inserted into the super-

ficial wound. A very large proportion of these cases eventually recover good joint motion without a second opening of the joint cavity. There is often a tight synovitis, surface heat, tenderness, and some temperature for several days.

In former times, we should rarely have possessed the courage to treat such alarming symptoms by fixation and traction alone, but should have advised further surgery, which, in the light of the war experience, we now know would have been ill-advised.

In cases of severely infected joints received later than twenty hours, it is probably best not to attempt complete closure, but to insert the Carrel tubes into the joint cavity and institute thorough Carrel-Dakin treatment.

Many of these joints may be expected to become partially or completely ankylosed, but the infection can usually be thus controlled, and the popliteal space rarely gives trouble. This war has taught us the value of flexibility, the necessity of submitting to evidence to the point of changing our conception if the evidence is trustworthy. No instance of this is more striking than in the heresy of Willems, which has apparently become gospel. The frankly septic pus discharging joint, if the patient recovered, became ankylosed. Willems began to insist on active motion at an early date and the recovery of the patient and the retention of motion in the joint became the expectation, not the rarity. The rule now established over seas in relation to frankly septic joints which have been subjected to operation and drainage is that active use up to the limit of toleration will do good rather than harm. The principle is stimulation of the circulation and drainage of the joint cavity lymph spaces by active motion. Passive motion is forbidden. As soon as the drainage operation has been performed a soft dressing is applied. Six hours rest is given and then the patient is encouraged to move the joint himself in spite of pain. This is repeated at least every three hours until it is possible for him to get out of bed. The pain of active use gradually lessens from day to day. The patient is actually wakened from sleep the night following his operation for this movement.

A certain amount of actual weight bearing is encouraged as soon as the patient is up.

RADIOGRAPHIC EXAMINATION

At the very earliest opportunity, radiographs should be taken in at least two planes, in all joint injuries. It is not sufficient to subject the case to fluoroscopic examination.

When stereoscopic methods of examination are available, they are often of great value.

Types of Wounds.

In considering the treatment of joint wounds in more detail, we shall attempt to roughly classify the lesions. We shall divide them into the following types:

1. CONTUSIONS WITH ONLY BRUISES OR SLIGHT LACERATIONS OF THE SKIN.

Such wounds are received from large pieces of shell or bodies, such as bricks, stones, pieces of timber, etc., which may be propelled with force when a shell explodes in the vicinity of the soldier. They may or may not be complicated by fracture, and this fracture may or may not involve the joint surfaces. In every case, a radiograph should be taken either stereoscopically or in two planes. We desire to emphasize again the fact that fluoroscopic examination is not sufficient to discover small cracks which may extend to the joints.

ABSENCE OF FRACTURES.

If there is no fracture after such careful radioscopic examination, fixation in a Thomas splint, with light traction for transport, and a continuance of this apparatus or a split or bridged plaster when the base hospital is reached, will result in subsidence of the synovitis. Hot fomentations should be applied for several days.

If in the knee joint the distention is extremely tight and painful, it is easy to relieve this by aspiration. If there is reason to believe the fluid to be blood, this procedure is actually advisable. A certain amount of distention by fluid is to be desired, since by it inflamed and bruised surfaces are kept apart and adhesions between the surfaces are less likely to form.

Active voluntary motion, without weight-bearing, should be instituted within a week if the tension and tenderness are diminishing. There should be freedom from weight-bearing for at least two weeks, and an amount of protection varying from a split plaster to a tight bandage for at least a month. This bandage may at first be applied over a voluminous sheet wadding or cotton wool dressing. Later on a flannel or compress cloth bandage, cut on the bias and slightly elastic, may be substituted. We deprecate the use of the rubber elastic bandage, since it causes so much atrophy of the muscles. If this atrophy is extreme to the point of paralysis, the graduated electrical contractions by means of the Faradic current and Bristow coil method are very useful, especially in the knee where great weakness of the quadriceps and of the vastus internus division in particular is not uncommon.

PRESENCE OF FRACTURE.

(*a*) *Without displacement.* If a fracture or fractures exist without displacement, the same procedures, coupled with a longer fixation and a longer freedom from weight-bearing, should result in the restoration of good function.

(*b*) *With displacement.* If displacement exists, this must be reduced, not necessarily at one sitting, but by means of gentle manipulation, followed by continuous traction. Here the Thomas splints, or, at the Base, the overhead frame and weight and counterweight traction, are most useful. Open operation after subsidence of the traumatic inflammation if these methods are not successful.

(*c*) *Loose fragments.* If a loose fragment of the articular surface is discovered by means of the x-ray, its removal is usually to be advised, since the union of this fragment, even if it can be replaced by manipulation, is rare. The presence of the synovial fluid bathing surfaces where the solution of continuity has occurred, seems to inhibit the growth of the cementing tissue. The time for the removal of this fragment is not, as a rule, immediately following the injury, but rather after the acute condition has begun to subside under fixation and traction and hot fomentation.

Sometimes, of course, the damage to the articular surface is so great, and the fragments so numerous that there is no recourse but excision, but this should be reserved for a last resort. We have seen many badly smashed articular bone ends form useful joints if the fragments were in close apposition and represented more impactions than loose fractures.

If there is an impaction of the main ends and one or more loose fragments, the removal of these should be delayed until the union of the impacted portions is so firm that the manipulation necessary at operation to reach and remove the loose fragments is not likely to disturb the impactions.

In all joint operations, the fact that the synovial membrane is resistant to infection, should not lead us to relax in the slightest degree the following of a most scrupulous aseptic technique and the gentlest of manipulations and tissue handling. The exploration should be entirely instrumental and not digital. In the presence of contused tissue, in which resistance to infection is always lowered, the approach to the joint should be through healthy tissue.

2. PERFORATING OR "THROUGH AND THROUGH" WOUNDS BY BAYONET OR RIFLE AND MACHINE GUN BULLETS

In the vast majority of cases, these perforating wounds leave no foreign body in their tract. The bayonet may possibly do so, but our experience and that of other men show that generally serious infections do not follow these "through and through" wounds if early fixation and moderate traction be applied.

If the projectile has caused a fracture, the same general plan of treatment which has been advised under non-perforating contusions should be followed. The case, whether a fracture does or does not exist, should be watched most carefully and continuously. Infection by some form of gas-producing bacilli is most to be feared, and if tension increases and crepitation is to be felt, a still closer watch must be kept, but, even in their presence, an operation is not always necessary, for we have seen such cases subside without operation. In one case, a fragment of shrapnel was discovered several months after the injury, imbedded in the femoral condyle close to the articular surface and surrounded by a small osteomyelitic cavity. It was thought best to remove this and Major Harvey Cushing tunnelled the condyle with a cranial burr without opening the joint from the external surface. The fragment of shrapnel was removed, a culture of the small osteomyelitic cavity, in which were a few drops of pus, was taken, and showed a pure culture of a gas-producing bacillus. A small rubber tissue drain was inserted into the bone cavity. In a few days the joint was distended and definite characteristic crepitation could be felt in various places. The tension and crepitation disappeared, however, without further operation and the external wound soon healed without sinus. In this case we knew the nature of the infecting organism and were able to observe the successful resistance of the joint tissues to this infection.

In all perforating, through and through wounds, it is much safer to take a culture from the depths of the trail on extrance. If the culture reveals any one organism, it is safer to watch the case under fixation and traction. A combination which the surgeon should especially dread is that of streptococcus with the gas-producing bacilli. It is probably safer if this combination exists to open and wash out the joint. It is very possible that a greater experience will lead us to advise the insertion of Carrel-Dakin tubes into the joint and treatment by this method for several days, after the temperature becomes normal.

3. PENETRATING WOUNDS.

By penetrating wounds, we mean those wounds caused by bayonets, shell fragments, shrapnel balls, and machine gun and rifle bullets, which enter the joint but do not emerge from the tissues.

With the exception of the penetrating bayonet wounds, the problem of the missile as a foreign body always presents itself, and the bayonet every now and then carries in a piece of clothing or chips off a piece of bone. In any event, the absolute necessity of the most careful radioscopic examination and accurate localization is evident.

In discussing the treatment, we will suppose that a foreign body exists in the joint. If the missile has passed through and is lodged in the superficial tissues, one can never be sure that bits of clothing do not remain in the joint and represent the most serious foci of infection. We will suppose that the culture does not show either the hemolytic streptococcus or a combination of the gas-producing group with the streptococcus.

(*a*) CASES RECEIVED WITHIN FIFTEEN OR TWENTY HOURS OF THE INJURY.

If the case be received within 15 or 20 hours, it is best to open the joint and remove all foreign bodies and completely detached portions of bone; great gentleness in handling the tissues is of the utmost importance. The approach should be by the path of the missile and a most scrupulous dissection and removal of all devitalized tissue should precede the joint exploration.

On reaching the joint, the gloved hands should be passed through a strong antiseptic, washed in sterile water or salt solution, and fresh instruments used. After the removal of the foreign body or bodies, the joint should be thoroughly irrigated by the method above described, and the synovia closed tight. Usually the external wound in these cases may be closed as well, but if there has been too great loss of tissue and skin, the wound should be treated as a sterile wound. There should never be more drainage planned than that afforded by one or two small rubber tissue drains or silk-worm gut setons running down to, but not passing through, the synovial membrane.

The joint should be immobilized in a Thomas arm or leg splint with moderate traction. Motion should be begun as outlined above.

(*b*) CASES RECEIVED LATER THAN TWENTY HOURS AFTER INJURY.

If the radioscopic examination reveals a foreign body or bodies the safest rule to follow is immediate operation and removal. The subse-

quent procedures are always a question of judgment aided by bacteriological examination. In many cases practice has demonstrated that it may be still safe to thoroughly wash out the joint as above described and to close tightly, the superficial tissues being left open, or partially open, and a small rubber tissue drain inserted, extending to the synovia but not into the joint.

Until a certain amount of experience and power of judgment has been acquired, it is probably safer to insert Carrel tubes into the joint cavity and institute the Carrel-Dakin treatment. There will be a greater danger of limitation of future mobility and function to be expected, but a lesser danger of serious infection, often difficult to control.

We have personally observed many cases received late, in which, in spite of the presence of foreign bodies, the signs of acute infection subsided under fixation, traction, hot fomentations, etc., that is, cases in which the natural resisting forces of the body were superior to the threatened immediate overwhelming attack of the infecting agents. If in these late cases with small foreign bodies the active inflammatory joint reaction is subsiding in spite of the presence of the foreign body, it may well be wiser to wait till the resistance of the body to the infecting agent is at its height before operating for its removal.

This time of heightened resistance, in our experience, seemed to be, as a rule, from the tenth to the fourteenth day. To teach this waiting policy as a routine is dangerous and one must always bear in mind the fact that the long continued presence of irritating agents, foreign bodies and low grade infections leads to synovial and bone changes which may progress to ankylosis and destroy future function.

The Carrel-Dakin treatment should be continued until the temperature remains normal for two or three days.

The same policy in regard to motion should be followed as outlined for the perforating wounds. Always active, never passive, and always conditioned by pain.

4. COMPLICATING FRACTURES.

The presence of fracture has the same bearing on the treatment as with the perforating, through-and-through wounds, and the operative procedures should be the same. Attempts at motion, of course, must be delayed.

The early removal of loose fragments and the Carrel-Dakin treatment offer, in our opinion, a better chance for future function than does

early excision, and while injuries to the cartilage always predispose to infection and slow restoration of function, we are inclined to advise the more conservative course.

The excision of frankly septic joints with the idea of thereby more easily controlling the sepsis is in our experience usually unsuccessful in its aim and disastrous in its results as to future function. The knee joint under certain circumstances may prove an exception to this statement.

After-treatment.

The after-treatment of these joint injuries has as its keynote function. There is a fairly general consensus of opinion forming that active voluntary attempts at motion bring about the most satisfactory results. Massage is of greatest help, electro and hydrotherapy are important, but upon active mechanotherapy and especially upon curative occupational therapy we can most surely rely for functional return of motion and strength.

We must keep constantly in mind, moreover, that those joints which are destined to become partially or completely ankylosed must be retained in positions favorable to future function. This is of utmost importance.

A shoulder should be fixed in from 50 to 80 degrees of abduction, an elbow in from 70 to 110 degrees of flexion, a wrist in slight dorsiflexion, a hand in slight supination, a hip in slight flexion, slight abduction and slight outward rotation, a knee in 10 to 30 degrees of flexion, an ankle at about the right angle with the leg. The variations from a single standard depend upon future occupation. There is no variation in the general principle.

Brisement forcé we deprecate almost without qualification when employed as a method to obtain motion. We admit that there are cases in which it is successful, but in old joints which have been septic we believe it is dangerous, unscientific, and usually unsuccessful.

Arthroplasty.

In the elbow and occasionally in the hip arthroplasty may succeed. Some form of absorbable membrane is probably better than pedunculated flaps as interposing substance. We have looked for justifying results in the shoulder and knee but we have not found them. We have attempted to gain them but have not succeeded.

Rare instances we have seen and experienced, but to one success there are ten failures and the first duty of the surgeon is still to do no harm.

A flattering success at the end of six months is usually flat failure in a year.

Summary.

The essentials in the treatment of gunshot injuries of joints seem to us to be the following, given in the order of their importance.

1. Fixation and traction provided at the earliest possible moment by thoroughly efficient splints and continued in transport till a hospital is reached, at which the patient may remain until convalescence from a possible operation is sufficiently well advanced to allow safe further transport (in all probability two or three weeks).

2. Early careful examination, radiographic, bacteriological, and clinical, at the earliest possible moment after the injury. This examination must be carried out by a specially trained surgeon capable of operating skillfully and at once, and at a well-equipped hospital, not far from the line, where the patient may remain under the close observation of this surgeon or his qualified assistants until convalescence is well established.

3. Primary, delayed primary, or secondary closure of the wound in all operative cases by a special technique now sufficiently well established to be regularly followed, which in the secondary closures involves a thorough knowledge of the Carrel-Dakin method.

4. After-treatment to assure most perfect function, consisting of early active motion. Later massage, possibly electrical and hydrotherapeutic treatment, often in conjunction with special orthopedic apparatus, and curative occupational therapy.

Orthopaedic Society Meeting.

SECTION IN ORTHOPÆDIC SURGERY.

NEW YORK ACADEMY OF MEDICINE, 17-21 WEST 43RD STREET. CLINICAL MEETING IN CHARGE OF THE HOSPITAL FOR DEFORMITIES AND JOINT DISEASES. FRIDAY EVENING, APRIL 18, 1919, AT 8.30 O'CLOCK, SHARP.

ORDER

I. Reading of the Minutes.

II. Presentation of Patients.

a. 1. Slides and x-ray demonstrations of interesting cases. Joseph Roth, M.D.

b. 1. Multiple bone cysts of os calcis; 2. Abscess of upper end of tibia; 3. Hemorrhagic osteomyelitis of wrist; 4. Fibro-sarcoma of wrist. Harry Finkeltein, M.D.

c. 1. Hysterical paralysis with lateral curvature; 2. Paralysis of both legs following influenza. Charles Rosenheck, M.D.

d. 1. Poliomyelitis of forearm with return of muscle function after fifty years. Florence V. Ralston, M.D.

e. 1. Focal infection of frontal sinus (blindness and arthritis); operation with cure. Harry Rodman, M.D.

f. 1. Rectal abscess with symptoms of sacro-iliac and sciatica for which patient was treated; relief by operation. Harry Goldman, M.D.

g. 1. Mediastinal tumor with paresis of left arm. Ignac Neumann, M.D.

h. 1. Fracture of ten years' duration; Lane plate in place; 2. Un-united fractures (2 cases); operation with cure; 3. Cervical rib pressure paralysis; operation with relief of pressure paralysis. Philip M. Grausman, M.D.

i. 1. Intra-uterine fractures. Albert L. Levy, M.D.

j. 1. Intra-uterine amputation. Samuel A. Jahss, M.D.

k. 1. Amputations and artificial limbs. David H. Levy, M.D.

l. 1. Comminuted fracture of elbow (2 cases). Max Strunsky, M.D.

m. 1. Dressing for fractured clavicle; 2. Dislocation of epiphyseal end of radius. Herman C. Frauenthal, M.D.

n. 1. Arthritis cured by typhoid injections. Maurice Packard, M.D.

o. 1. New method of treating detached semilunar cartilages; 2. New method of treating fractured olecranon; 3. New method of treating congenital dislocation of the hip; 4. Interesting cases of obliterating endarteritis. Henry W. Frauenthal, M.D.

III. Discussion.

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Book Review

Treatment of War Wounds by the Method of Mencière. CREIGNOU, Médicin Major de 1re Classe des Troupes Coloniales, and G. BLAQUE, Licenciés-Sciences, Lauréat de l'Ecole Supérieure de Pharmacie de Paris. Paris: 1918. Librairie J. P. Baillière et Fils.

It is no longer necessary to eulogize the method instituted by Mencière for the treatment of infected wounds. The proofs of its efficacy accumulate and the method becomes more widespread from day to day. It unites usefulness and simplicity.

The book, which is intended as a *vade-mecum* for those availing themselves of the method, treats the subject under the following headings: General considerations of the Mencière method: The active principles of dressing of wounds; Formulas: (*a*) solution, (*b*) emulsion, (*c*) water, (*d*) pomade; Material necessary for the application of the method; Technique of the dressing: (*a*) routine application of the balm, (*b*) delayed application of the balm; Application at the front line and at evacuation stations; Bacteriologic and cytologic control.

Current Orthopaedic Literature

Numerals at head of each abstract are for use in connection with the official "Classification of Orthopædic Literature," published in the JOURNAL for January, 1917, reprints of which are obtainable from the JOURNAL office.

III. ORTHOPEDIC OPERATIVE, POST OPERATIVE, AND ADJUVANT TECHNIC.

III, 7, c.

THE POSITION OF THE OPERATION FOR THE EXCISION OF A CARTILAGE IN MILITARY SURGERY. T. E. Hammond, M.D. *British Medical Journal*, Dec. 28, 1918.

This paper is a very interesting one. His statistics were gotten up at the request of General Sir Robert Jones, upon operations performed at Alder Hey Military Orthopædic Hospital for damaged semilunar cartilages of the knee joint. The total number of cases admitted with the diagnosis of misplaced cartilage to the end of 1917 was 283. The total number of cases operated upon for the excision of a cartilage or a synovial fringe was 112. In many of the remaining 171 cases nothing abnormal could be found, while in others only slight wasting of the quadriceps was observed. In 20 cases definite osteoarthritis was present; in 7, tuberculous disease; in 4, villous synovitis; and in 1 sarcoma at the lower end of the femur. Of the 112 cases operated upon, 8 were discharged as fit for general service immediately; 99 were discharged to a command depot as fit for general service within four months; five were discharged as fit for home service only. The average stay in hospital before operation was 22 days, and varied from 3 to 50 days. The average stay in hospital after operation was 85 days, and varied from 21 to 135 days.

In order that the final category of officers and men discharged for general service in four months should be known, a request was sent to Records for their posting after discharge with the present category. Replies were received in 36 cases.

	Number	Percentage
Class A (General Service)	19	53
Class B (Garrison Duty)	8	22
Class C (Home Service)	5	15
Class P (Reserve)	2	5
Unfit for further military service	2	5

Five of the Class A men had been killed in action.

For comparison a similar proceeding was carried out in cases in which nothing abnormal was found with the knee, and the soldier was discharged to a command depot as fit for general service in four months. Replies were received in 27 cases.

	Number	Percentage
Class A	9	33
Class B	4	15
Class C	5	19
Class P	6	22
Unfit for further military service	3	11

From a purely military aspect an operation of choice is only justifiable if it raises the soldier's category, or relieves him of a condition the persistence of which would be harmful. It is dangerous for a soldier, liable to recurrent dislocation, to be placed in the firing line (Class A). The highest category in which he should be put is B (Garrison duty), and then only if recurrence is infrequent; otherwise arthritis may arise.

Internal derangement of the knee in the intervening stage is easily simulated. In a doubtful case the conscientious medical officer will often give the patient the benefit of the doubt, since he realizes the risk of sending the genuine case back into the firing line, and knows that subjective symptoms without definite physical signs are not uncommon. Were all such cases to be returned to the firing line a grave injustice would be done to the genuine case. On the other hand were all the cases to be placed in Class B malingering would certainly increase.

Full movement of the knee after an operation is usually regained in three weeks, and graduated exercises should then be started. There would be no necessity for the cases to stay in hospital were it possible for them to be sent to a special command depot to be under the supervision of a medical officer who understands his work, and the method of developing the quadriceps by graduated and resistance exercises. The post-operative stay in hospital would thus be considerably reduced and a much larger percentage of the patients would rejoin their units in a much shorter period of time.

That only 83 per cent. of the men discharged are finally passed as fit for general service is due to lack of judgment and perhaps energy on the part of the medical officers at the command or regimental depots. During my term of office as registrar at Alder Hey on no occasion did any communication about a knee operation arrive. That the category of 47 per cent. should have been lowered without any reference to the nature of the operation indicates that far too much attention is paid to subjective symptoms. With proper supervision 95 per cent. of the cases operated upon should have been placed in Class A.—*M. S. Henderson, Rochester, Minn.*

III, 8, *b* and *c*.

A Practical Method for Making Molds of the Hands and Feet. Roederer. *Paris Médical*, Nov. 30, 1918, p. 416.

Molds of a deformed part furnish a means of record much better than descriptions or photographs. Unfortunately, however, the classical methods of molding are not applicable to the hands and feet, especially if the member have a hooked or other complicated deformity. For all such molds the following method can be used to advantage. A cylinder formed by rolling up cardboard and tying with twine is set on end on a flat surface. A little plaster paste is poured in to close it at the bottom. The hand is carefully oiled and a strong string laid along the border of it from the inner side of the wrist down around the tips of the fingers and thumb and back up along the outer side of the wrist, and held in place by wax. If the fingers are to be separated the string should follow around the sides of each finger, and if there is a *main de griffe* or other deformity, more than one string will have to be used in order to divide the plaster into as many pieces as necessary to allow the hand to be easily freed.

Plaster paste sufficient to fill the cylinder is then made and poured in. The hand, prepared as described above, is inserted into the plaster and at the precise moment when the plaster is set enough to maintain its shape, but not too hard, the string is pulled at each end, cutting the negative mold so that it falls apart. The positive mold is then obtained by fitting the negative together and filling with plaster cream which may be colored with

carmen to facilitate the removal of the white particles of the negative. For the foot the technic is varied to suit the size and shape of the member.—*William Arthur Clark, Chicago.*

XIII. ACUTE AND CHRONIC AFFECTIONS OF MUSCLES, TENDONS, AND LIGAMENTS.

XIII, 3.

A Contribution to the Study of Myositis Ossificans Progressiva. Julius Rosenstirn. *Annals of Surgery,* December, 1918.

Dr. Rosenstirn gives a continuation of a former paper in the *Annals of Surgery.* He reports a case under his own observation, including x-ray findings, microscopic pathology, and operative treatment. He takes up the condition as observed in dogs. He quotes the observations of many other investigators. The paper covers over forty printed pages and the bibliography occupies eight pages. There are many excellent illustrations showing roentgenograms and microscopic slides.

Dr. Rosenstirn's conclusions follow:

1. Myositis ossificans progressiva is a misnomer for a pathological process of atopic ossification starting primarily in the connective tissue of the exoskeleton and involves in its further progress the tissues of the endoskeleton. It would be better named fibrocellulitis ossificans progressiva. The disease nearly always commences at an early period of life and shows as additional characteristic symptoms a microdactylia of fingers and toes, and in some cases a more or less pronounced degree of infantilism.

2. Similar to the primary hemorrhage of the traumatic myositis ossificans, the introductory feature of the pathological process in the progressive form is an initial intercellular capillary hemorrhage which starts the growth of newly-formed connective tissue surrounding the hemorrhagic extravasation without any previous hypertrophy of the adjacent connective tissue.

3. Calcification and ossification take place at first at the newly-formed connective-tissue strands encircling the hemorrhagic mass, and with few exceptions from within outward.

4. There is an apparent active participation of the enclosed erythrocytes in the bone formation; they change their round form to a spindle-cell shape and seem to become nucleated as they approach the osteogenetic edge of the encircling ring and merge into its substance.

5. The microdactylia has an endogenetic origin and is the result of an "anlage" defect of the carnal and tarsal tissue rays (*gewebsstrahlen*), causing thereby an imperfect development of the last endings of the extremities in one part or other.

6. The initial hemorrhage is probably due to a similar cause affecting the integrity of the last endings of the vascular system, the capillaries, from which the hemorrhage starts.

7. The calcification and consequent ossification of the newly-formed connective tissue is due directly and indirectly to the primary hemorrhage. The hemorrhagic effusion with its calcium content starts the first deposit of lime and indirectly stimulates its continuation by a nutritive impairment of the surrounding tissue from pressure of the extravasation.

8. Investigations made under scientifically correct premises show there is no reason for believing in a diminished calcium excretion or a calcium retention in this disease.

9. No therapeutic measures against the products or the progress of the disease have proven of any value.—*Harold A. Pingree, Portland, Maine.*